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A Preliminary Anthropometry Standard for Australian Army Equipment Evaluation

Mark Edwards, Alistair Furnell, Jemma Coleman and Sheena Davis

Land Division
Defence Science and Technology Organisation

DSTO-TR-3006

ABSTRACT

Anthropometry is the measurement and comparison of different body shapes and sizes in the general population. This standard presents anthropometric data representative of the Australian Defence Force (ADF) Army, specifies the summary values for 84 anthropometric dimensions, provides a set of boundary manikins and provides guidance on how the data presented can be used to perform anthropometric assessments to assess fit, clearance, reach, vision and/or posture of a human operator in a system using a risk based approach.

This standard is to be used to evaluate soldier systems for use by the ADF Army in terms of user fit, clearance, reach, vision and posture. Applicable systems include platforms that soldiers work in, or are transported in, and body worn equipment. Given that a built system is not a requirement of the processes described, this standard can also be used early in the design process to de-risk the design process.

It must be noted that the data provided in this report are representative of the 2012 ADF Army population. The impacts of secular changes are not addressed in this standard. Should secular changes be identified as of importance, appropriate modifications should be made to the data contained in this standard.

This report supports Defence outcomes by providing an up to date anthropometric dataset that is representative of Australian Army personnel. This will allow assessments to be made of the performance of existing and new soldier systems in terms of fit, clearance, reach, vision and posture.

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A Preliminary Anthropometry Standard for Australian Defence Force Army Equipment Evaluation

Executive Summary

Anthropometry is the measurement and comparison of different body shapes and sizes in the general population. Datasets are constructed by measuring body dimensions of a large sample of personnel. In 2012 a survey of male and female Australian Defence Force (ADF) Army personnel was completed. This survey is known as the Australian Warfighter Anthropometry Survey (AWAS). The results of this survey have been used as the basis of this standard and supersede all previous ADF Army anthropometric data.

This standard presents anthropometric data representative of ADF Army personnel. It also presents guidance for the application of this data for assessing the level of physical accommodation provided by the ADF Army equipment and platforms.

This standard is to be used to evaluate soldier systems for use by the ADF Army in terms of user fit, clearance, reach, vision and posture. Applicable systems include platforms that soldiers work in, or are transported in, and body-worn equipment. Given that a built system is not a requirement of the processes described, this standard can also be used early in the design process to de-risk the design process.

Three bodies of data are presented in this standard:

- Univariate statistics; statistical data for 84 human body dimensions.
- Multivariate statistics; seven boundary manikins that represent the extremes of the Army user population.
- Protective Equipment and Clothing Correction Factors (PECCFs); corrections that can be applied to anthropometric data to account for the equipment worn by Army personnel.

Broadly, it is intended that for vehicles and other habitable areas the multivariate boundary manikins can be used to build digital human models and/or select trial participants for vehicle design evaluations. The manikins are naked and the relevant PECCFs should be added according to the equipment ensemble worn by the crew. For dismounted equipment, where an item is designed to fit on or near the skin, it is intended that the univariate statistics be used. The relevant PECCF should be added where an item is required to be worn over the top of existing items.

Guidance on the assessment of user fit, clearance, reach, vision and posture is provided in the report based on identifying key task points and possible risks for each task. The identification of possible risks has been addressed through the use of these five

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keywords: fit, clearance, reach, vision and posture. This guides the reader into the selection of an appropriate assessment procedure.

Guidelines are provided for the performance of univariate and multivariate assessment methods. These include how to use the data contained within this report, how to generate pass/fail criteria and reporting requirements.

It must be noted that the data provided in this report are representative of the 2012 ADF Army population. The impacts of secular changes are not addressed in this standard. Should secular changes be identified as being of importance, appropriate modifications should be made to the data contained in this standard.

This report supports Defence outcomes by providing an up to-date anthropometric dataset that is representative of Australian Army personnel. This will allow assessments to be made of the performance of existing and new soldier systems in terms of fit, clearance, reach, vision and posture.

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Contents

| | |
|---|-----------|
| 1. SCOPE | 1 |
| 1.1 Identification | 1 |
| 1.2 Australian Warfighter Anthropometry Survey | 1 |
| 1.3 System Overview | 1 |
| 1.4 Document Overview | 2 |
| 2. DEFINITIONS AND REFERENCED DOCUMENTS | 3 |
| 2.1 Definitions | 3 |
| 1.1. Referenced Documents | 3 |
| 3. APPLICATION GUIDELINES | 4 |
| 3.1 General Requirements | 4 |
| 3.2 Use of Data | 4 |
| 3.3 Secular changes considerations | 5 |
| 4. UNIVARIATE STATISTICS | 8 |
| 4.1 Introduction | 8 |
| 4.2 Univariate Assessment Procedure | 8 |
| 4.3 Measurement Guide | 11 |
| 4.4 Summary Statistics | 17 |
| 4.4.1 Cervicale Height (M01) | 17 |
| 4.4.2 T2 Height (M02) | 18 |
| 4.4.3 Acromion Height (M03) | 19 |
| 4.4.4 Suprasternale Height (M04) | 20 |
| 4.4.5 Substernale Height (M05) | 21 |
| 4.4.6 Tenth Rib Height (M06) | 22 |
| 4.4.7 Iliocristale Height (M07) | 23 |
| 4.4.8 Crotch Height (M08) | 24 |
| 4.4.9 Eye Height, Sitting (M09) | 25 |
| 4.4.10 Acromion Height, Sitting (M10) | 26 |
| 4.4.11 Elbow Rest Height (M11) | 27 |
| 4.4.12 Thigh Clearance (M12) | 28 |
| 4.4.13 Knee Height, Sitting (M13) | 29 |
| 4.4.14 Popliteal Height (M14) | 30 |
| 4.4.15 Interpupillary Breadth (M15) | 31 |
| 4.4.16 Bizygomatic Breadth (M16) | 32 |
| 4.4.17 Biacromial Breadth (M17) | 33 |
| 4.4.18 Bideltoid Breadth (M18) | 34 |
| 4.4.19 Chest Breadth (M19) | 35 |
| 4.4.20 Chest Depth (M20) | 36 |
| 4.4.21 Bicristale Breadth (M21) | 37 |
| 4.4.22 Forearm-Forearm Breadth (M22) | 38 |
| 4.4.23 Abdominal Extension Depth, Sitting (M23) | 39 |
| 4.4.24 Hip Breadth, Sitting (M24) | 40 |

UNCLASSIFIED

DSTO-TR-3006

| | | |
|--------|--|----|
| 4.4.25 | Buttock-Knee Length (M25) | 41 |
| 4.4.26 | Buttock-Popliteal Length (M26) | 42 |
| 4.4.27 | Foot Breadth, Horizontal (M27) | 43 |
| 4.4.28 | Head Circumference (M28) | 44 |
| 4.4.29 | Neck Circumference, Base (M29) | 45 |
| 4.4.30 | Shoulder Length (M30) | 46 |
| 4.4.31 | Biceps Circumference, Flexed (M31) | 47 |
| 4.4.32 | Forearm Circumference, Flexed (M32) | 48 |
| 4.4.33 | Chest Circumference (M33) | 49 |
| 4.4.34 | Chest Circumference Below Breast (M34) | 50 |
| 4.4.35 | Waist Circumference (Omphalion) (M35) | 51 |
| 4.4.36 | Buttock Circumference (M36) | 52 |
| 4.4.37 | Thumbtip Reach (M37) | 53 |
| 4.4.38 | Stature (M38) | 54 |
| 4.4.39 | Sitting Height (M39) | 55 |
| 4.4.40 | Weight (M40) | 56 |
| 4.4.41 | Head Breadth (M41) | 57 |
| 4.4.42 | Head Length (M42) | 58 |
| 4.4.43 | Menton-Sellion Length (M43) | 59 |
| 4.4.44 | Bitragion Submandibular Arc (M44) | 60 |
| 4.4.45 | Neck Circumference, Mid (M45) | 61 |
| 4.4.46 | Nape to Bustpoint Thelion Length (M46) | 62 |
| 4.4.47 | Nape to Waist Over Bust (M47) | 63 |
| 4.4.48 | Scye Depth (M49) | 64 |
| 4.4.49 | Back Width (M50) | 65 |
| 4.4.50 | Back Length (M51) | 66 |
| 4.4.51 | Nape to Waist Centre Back (M52) | 67 |
| 4.4.52 | Vertical Trunk Circumference (M53) | 68 |
| 4.4.53 | Crotch Length Omphalion (M54) | 69 |
| 4.4.54 | Waist Circumference (Preferred) (M55) | 70 |
| 4.4.55 | Maximum Hip Circumference (M56) | 71 |
| 4.4.56 | Waist-Hip Distance (M57) | 72 |
| 4.4.57 | High Hip Circumference (M58) | 73 |
| 4.4.58 | Hip Circumference (M59) | 74 |
| 4.4.59 | Acromion-Radiale Length (M60) | 75 |
| 4.4.60 | Radiale-Stylion Length (M61) | 76 |
| 4.4.61 | Sleeve Outseam (M62) | 77 |
| 4.4.62 | Wrist Circumference (M63) | 78 |
| 4.4.63 | Hand Circumference (M64) | 79 |
| 4.4.64 | Hand Breadth (M65) | 80 |
| 4.4.65 | Hand Length (M66) | 81 |
| 4.4.66 | Thigh Circumference (M67) | 82 |
| 4.4.67 | Knee Circumference (M68) | 83 |
| 4.4.68 | Calf Circumference (M69) | 84 |
| 4.4.69 | Ankle Circumference (M70) | 85 |
| 4.4.70 | Foot Length (M71) | 86 |
| 4.4.71 | Ball of Foot Length (M72) | 87 |

UNCLASSIFIED

| | | |
|-----------|---|------------|
| 4.4.72 | Seat Angle (M73) | 88 |
| 4.4.73 | Outside Leg Length (M74) | 89 |
| 4.4.74 | Chest and Bust Level (M75, M76) | 90 |
| 4.4.75 | Waist Level Centre Front (M77) | 91 |
| 4.4.76 | Hip Level, Male and Female (M78, M82) | 92 |
| 4.4.77 | Waist Level Centre Back (M79) | 93 |
| 4.4.78 | Seat Level (M80)..... | 94 |
| 4.4.79 | Trochanteric Height (M81) | 95 |
| 4.4.80 | Knee Level (M83)..... | 96 |
| 4.4.81 | Ankle Height (M84)..... | 97 |
| 4.4.82 | Front Length (M85) | 98 |
| 5. | MULTIVARIATE STATISTICS..... | 99 |
| 5.1 | Introduction | 99 |
| 5.2 | Multivariate Assessment Procedure..... | 99 |
| 5.3 | Boundary Manikin Data..... | 103 |
| 6. | PERSONAL EQUIPMENT AND CLOTHING CORRECTION FACTORS | 105 |
| 6.1 | Introduction | 105 |
| 6.2 | PECCF Data..... | 105 |
| 7. | APPLICATION MATRIX..... | 108 |
| 7.1 | Anthropometric Dimension Application Matrix..... | 108 |

LIST OF ANNEXES

| | |
|---------|-------------------------------|
| Annex A | Body Landmark Definitions |
| Annex B | Boundary Manikin Measurements |

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1. Scope

1.1 Identification

Anthropometry is the measurement and comparison of different body shapes and sizes in the general population. Datasets are constructed by measuring body dimensions of a large sample of personnel. In 2012 a survey of male and female Australian Defence Force (ADF) Army personnel was completed known as the Australian Warfighter Anthropometry Survey (AWAS). The results of this survey are reported as the basis of this standard and supersede all previous ADF Army anthropometric data.

This standard presents anthropometric data representative of ADF Army personnel and guidance for the application of this data for assessing the level of physical accommodation provided by the ADF Army equipment and platforms.

1.2 Australian Warfighter Anthropometry Survey

The AWAS measured 2138 full time ADF Army personnel (277 females and 1861 males), aged between 18 and 40 years. The Corp profile was broadly representative of the users of Armoured Fighting Vehicles such as the M113 Armoured Personnel Carrier and Australian Light Armoured Vehicle (ASLAV). Corps sampled included Armour, Artillery, Electrical and Mechanical Engineers, Engineers, Infantry, Medical, Transport, Signals, Ordnance and Special Forces.

Given the use of the AWAS as the basis for this standard, this data should only be used for assessment of equipment for use by the Australian Army. Any differences between the data presented in this standard and that for other nations and/or user groups is not quantified in this standard and would require consideration if this data were used for a user group dissimilar to that sampled by AWAS.

1.3 System Overview

This document provides a preliminary standard for anthropometry applicable to the ADF Army. This document has been developed by DSTO and is intended to be used for consultation with ADF stakeholders, international partners and industry prior to it being released as an Australian Defence Standard (DEF (AUST)). As such, the language used reflects the intention for it to be released as an DEF(AUST).

The procedures and data provided within this standard are to be used to evaluate soldier systems for use by the Australian Army in terms of user fit, clearance, reach, vision and posture. Applicable systems include platforms that soldiers work in or are transported in and body worn equipment. In addition to providing a method for producing verification evidence for completed system designs, it is intended that the data and procedures given in this standard can be used early in the design process to de-risk the design process as a built system is not a requirement of the processes described in this standard.

The data provided within this standard can also be used to support the specification of requirements, the design of soldier systems and the specification of trial participants for user trials to evaluate soldier systems.

1.4 Document Overview

This standard identifies and specifies the summary values for 84 anthropometric dimensions, provides a set of boundary manikins and provides guidance on how the data presented can be used to perform anthropometric assessments.

This document is intended to be used by Human Factors Specialists, Requirements Managers and Engineers to define appropriate requirements, design systems to meet said requirements and provide validation evidence that said requirements have been met.

No part of this document is classified for security purposes.

2. Definitions and referenced documents

2.1 Definitions

| | |
|----------------------|---|
| ADF | Australian Defence Force |
| Anthropometry | The measurement of the size and proportions of the human body |
| AWAS | Australian Warfighter Anthropometry Survey |
| CAD | Computer Aided Design |
| DEF (AUST) | Australian Defence Standard |
| DHM | Digital Human Modelling |
| Eye Point | The location of the operator's view expressed as a monocular point mid-way between the pupils |
| FPS | Function and Performance Specification |
| PECCF | Personal Equipment and Clothing Correction Factor |
| SCE | Soldier Combat Ensemble, defined as soldier systems designed to provide protection to individual combatants from physical threats and the environment, as well as facilitating an efficient means for individuals to carry mission essential items in a close combat environment. |
| SME | Subject Matter Expert |
| System | Defined as a combination of components or parts forming a complex or unitary whole which may include hardware systems, software systems, training systems, support systems and personnel, for example a land vehicle or a helicopter |

&& Referenced Documents

The Australian Macquarie Dictionary is the reference source for all terms used in this standard, except for those defined in this Definitions section.

The following documents form a part of this standard to the extent specified herein. For using this standard, the latest issues of the following documents at the issue date of this standard shall apply:

- MIL-STD (2012). Department of Defense Design Criteria Standard Human Engineering. 1472G. Department of Defense (USA)

3. Application Guidelines

3.1 General Requirements

The Function and Performance Specification (FPS) of a project shall state whether the data required is male and female or one gender only. Where no specific statement exists then both gender data shall be used as the default.

The FPS shall state the level of accommodation required. This is predominantly defined as being either:

- *“Full Accommodation” – The design shall physically accommodate the central 98% of users.*
It is expected that this level of accommodation will be specified at times when operator fit, clearance, reach, vision or posture is a key factor in the system and impinging of any of these factors will result in large safety and/or performance issues.
- *“Majority Accommodation” – The design shall physically accommodate the central 90% of users.*
It is expected that this level of accommodation will be specified at times when operator fit, clearance, reach, vision or posture is a factor in the system and impinging of any of these factors may result in safety and/or performance issues.

Where specifications state “5th to 95th percentile range” as the level of accommodation this should be taken to equate to the “majority accommodation”. However, current good practice for defining accommodation range is to state the percentage of the population that should be accommodated, as per the definitions above. Legacy statements such as “5th to 95th percentile” should be avoided.

3.2 Use of Data

Three bodies of data are presented in this standard:

- Univariate statistics; statistical data for specific human body dimensions (see Section 4).
- Multivariate statistics; a range of boundary manikins that represent the extremes of the Army user population (see Section 5).
- Protective Equipment and Clothing Correction Factors (PECCFs); corrections that can be applied to the univariate and multivariate data to account for the equipment worn by Army personnel (see Section 6).

Broadly, it is intended that for vehicles and other habitable areas the multivariate boundary manikins can be used to build digital human models and/or select trial participants in order to evaluate vehicle design. The manikins are naked and the PECCFs must be added according to the ensemble stated in the FPS. For dismounted Soldier Combat Ensemble (SCE) equipment, where an item is designed to fit on or near the skin, it is intended that the univariate statistics shall be used. Where an item is required to be worn over the top of existing SCE items then the relevant PECCF should be added.

The data provided within this document is intended to be used to assess fit, clearance, reach, vision and/or posture of a human operator in a system, risks and examples are provided in Table 1. It is recommended that the anthropometric assessment types given in Table 1 are

assessed using either univariate or multivariate methods, depending on the complexity of the assessment required. The procedure recommended for choosing between univariate and multivariate assessments is shown in Figure 1. This process is based on identifying key task points where risks may be present within each task. The identification of possible risks is done through the use of five keywords which correspond to the types of assessments that can be performed using anthropometric data; fit, clearance, reach, vision and posture.

Stage 1.5 of the procedure shown in Figure 1 requires the assessor to identify if the assessment aspect and task risk is “Defined by a single dimension.” This should be taken to mean the assessment can be performed through the consideration of only one anthropometric measure (or anthropometric measures that are independent of each other). For example, when assessing Fit (assessment aspect) when passing through a doorway (key task point), there is a risk of hitting the head (task risk). In this example there is only one key dimension: Stature (M38). . However, when assessing reach (assessment aspect) to controls when seated in a vehicle (key task point), there is a risk of not being able to reach a control (task risk). In this example there are multiple key dimensions which define the reach envelope; Acromion height, sitting (M10) and Thumbtip reach (M37). Therefore the number of (dependent) dimensions is considered the key factor during the assessment.

3.3 Secular changes considerations

In the context of anthropometry, secular changes are taken to refer to changes in the values for each dimension that occur from generation to generation, and should be taken into account for the life of a system. These changes are commonly attributed to changes in environmental variables such as diet.

The data provided in this report are representative of the 2012 ADF Army population as defined in Section 1.1 and 1.2. The impact of secular growth changes are not addressed in this standard and, should secular growth be identified as of importance, appropriate modifications should be made to the data contained in this standard.

Table 1 Anthropometric assessment types

| Assessment type | Definition | Risks | Example |
|----------------------|--|--|--|
| Fit | Does the system accommodate the specified range of users? | <i>Performance</i> – full range of users unable to operate system given that they cannot fit within it or the equipment will not fit them <i>Safety</i> - users may compromise their safety to operate the system | Does a helmet fit the specified user population in terms of head size? |
| Clearance | Does the system prevent undesirable contact with the body | <i>Performance</i> - if users are immobilised then they will be unable to continue working. If access to controls are impinged, then the user's ability to operate the system will be reduced <i>Safety</i> - injury may be caused by the body striking nearby equipment or getting trapped | Will the driver's head strike equipment fitted to the vehicle ceiling? |
| Reach | Does the system provide suitable placement of controls and/or equipment? | <i>Performance</i> - if controls cannot be operated then this prevents the system operation <i>Safety</i> - if safety features such as handholds and fire extinguishers cannot be reached then this increases the risk of injury | Can the driver reach the steering whilst simultaneously operating the accelerator/brake? |
| Vision | Does the system allow a suitable eye point to be achieved to provide the user with an appropriate field of view? | <i>Performance</i> - if the user cannot achieve a suitable eye point to see what is needed for the task then they cannot perform the task optimally <i>Safety</i> - if the user does not see a hazard, then this may result in injury either to themselves or another | Can a suitable eye point be achieved to provide the user with a field of view that allows a sight picture to be taken on a vehicle mounted weapon? |
| Posture ¹ | Does the system allow a safe, comfortable and effective posture to be achieved? | <i>Performance</i> - poor posture will increase user fatigue which may reduce performance <i>Safety</i> - poor posture increases the stress placed on the body and increases the risk of musculoskeletal injury | Does the vehicle allow the driver to maintain a posture that supports the driving task? |

¹ Anthropometric analysis is one part of posture assessment. Posture assessment also requires consideration of other aspects such as task frequency, time posture is held, forces applied to/by the body, support of the limbs and joint angles. As such, posture assessment should be performed by a suitably qualified Human Factors Subject Matter Expert (SME).

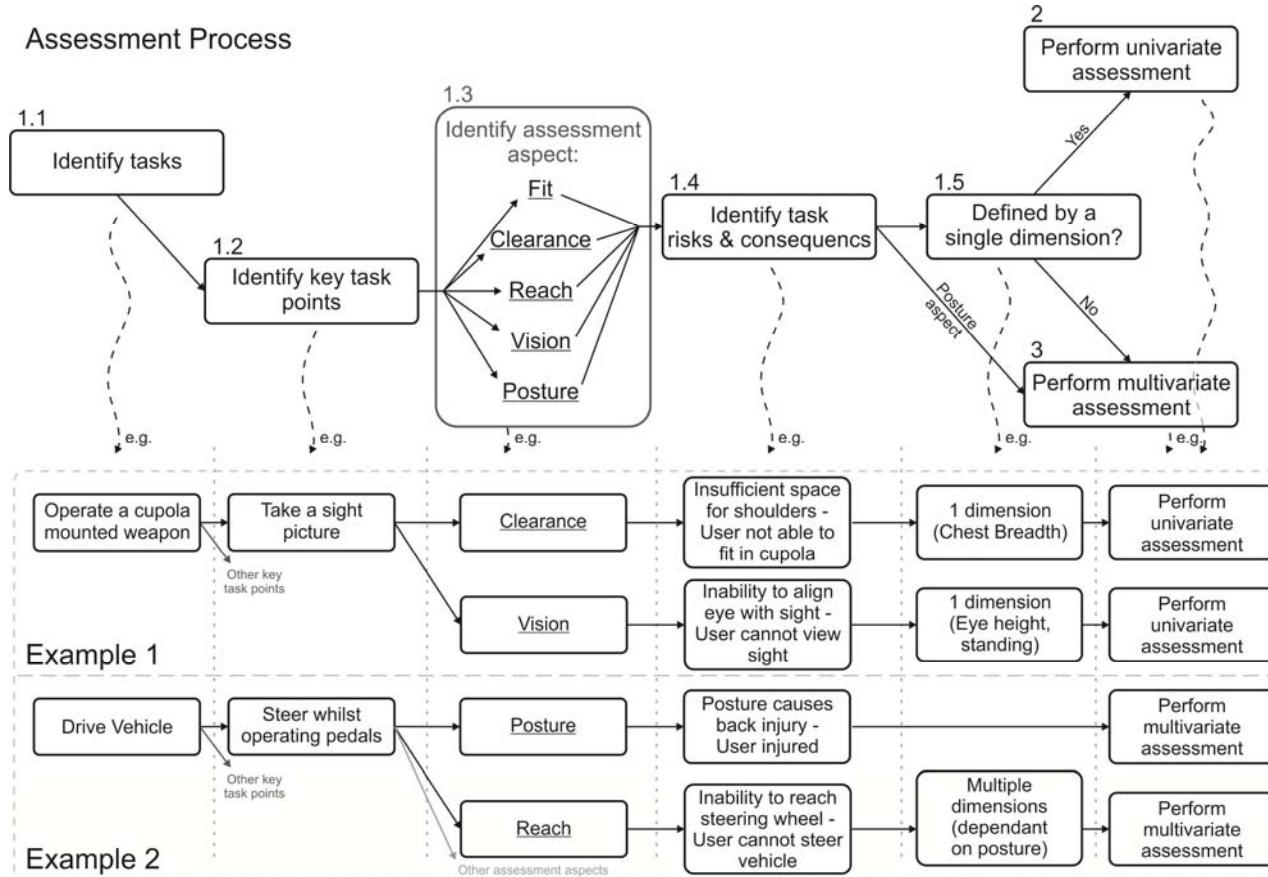


Figure 1 Assessment type selection procedure (top) with examples (bottom)

4. Univariate Statistics

4.1 Introduction

Summary statistics for each of the anthropometric measurements collected by the AWAS study are presented in this section with guidance for their application. All landmarks used during the collection of these measurements are presented in Annex A.

4.2 Univariate Assessment Procedure

The univariate assessment procedure, shown in Figure 2, is intended to be used for assessments where one anthropometric dimension is considered key and unrelated to other body dimensions. For example, Stature might be considered the key dimension when assessing clearance through a doorway. It should be noted that there are some instances where more than one dimension is considered key; however, as they are unrelated each can be assessed separately using the univariate assessment procedure.

This procedure requires four inputs:

- The key anthropometric dimension; determined through consideration of the identified task and risk.
- The relevant PECCF (if required); using the tables provided at Section 6.
- The worst case percentiles based on the specified level of accommodation²; the largest and/or smallest users for the target user population.
- Any miscellaneous adjustments (if required); any other adjustments that should be added, for example a comfort clearance.

These inputs are used to create assessment pass-fail criteria through addition of the relevant percentile measurements for each dimension, PECCFs and miscellaneous adjustments.

For example, if fit (assessment aspect) is being assessed when passing through a doorway (key task point) to identify if there is a risk of hitting the head (task risk), the pass-fail criteria for a majority accommodation requirement can be calculated through the summation shown in Table 2. The pass-fail criteria produced can then be applied to the system; either using Computer Aided Design (CAD) data, drawings of the system or physical measurement of a prototype.

Table 2 Example pass fail criteria calculation

| Input | Description | Value (mm) |
|---------------------------|--|------------|
| Key dimension | Stature (M38) | 1899 |
| Worst case percentile | 95 th percentile, male | |
| PECCF | Stature, dismounted close combatant (EM01) | 71 |
| Miscellaneous adjustments | None identified | 0 |
| Pass-fail criteria | | 1970 |

² Given that univariate assessments are defined by their use on a single key dimension, "Full accommodation" should be taken to refer to 1st percentile to 99th percentile for the key anthropometric dimension. "Majority accommodation" should be taken to refer to 5th percentile to 95th percentile for the key anthropometric dimension.

Reporting from this assessment should provide sufficient information to permit the assessment to be repeated, including:

- A description of the task assessed, key task points, perceived risk and assessment type.
- A summary of the inputs used.
- A drawing and/or image of the assessment that shows the measurements taken, including relevant body landmarks used.
- Any measurement delta(s) for the assessment, for example clearances between the body and equipment³.
- A risk statement for any assessment failures which states the likelihood and consequence associated with the risk.

³ Provision of the measurement delta is intended to allow the degree of compliance to be identified, which will in turn support the risk assessment

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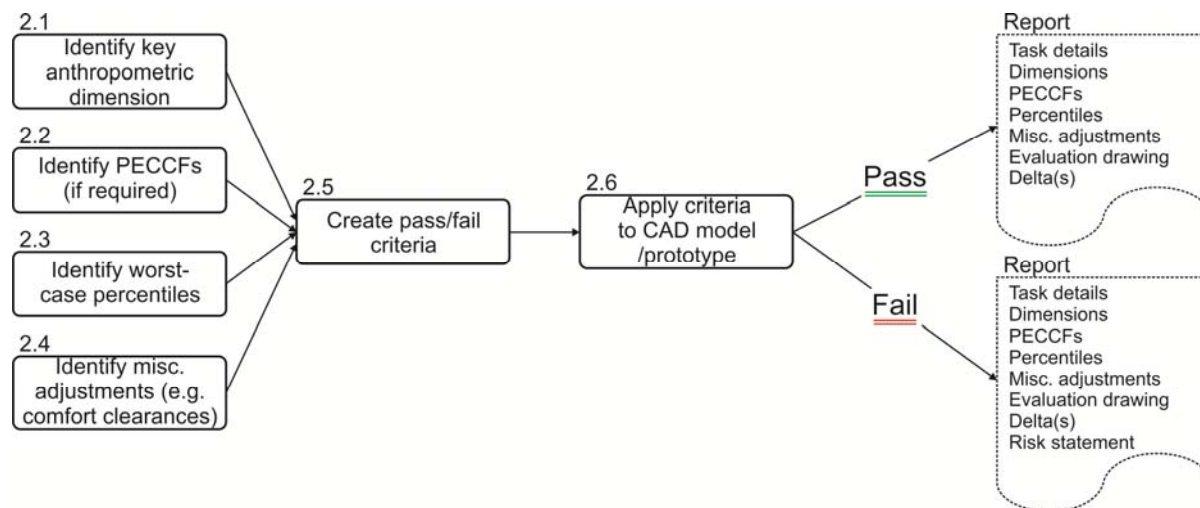


Figure 2 Univariate assessment procedure

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4.3 Measurement Guide

The measurements collected are shown visually in Figure 3 to Figure 7 with reference to the appropriate page for each dimension provided in Table 3 to Table 7 to allow easy identification. The measurements are broken down into whole body dimensions, limb dimensions, body and limb circumference dimensions, seated dimensions, and, heads, hands and feet dimensions. The summary statistics for all 84 dimensions are presented in Section 4.4.

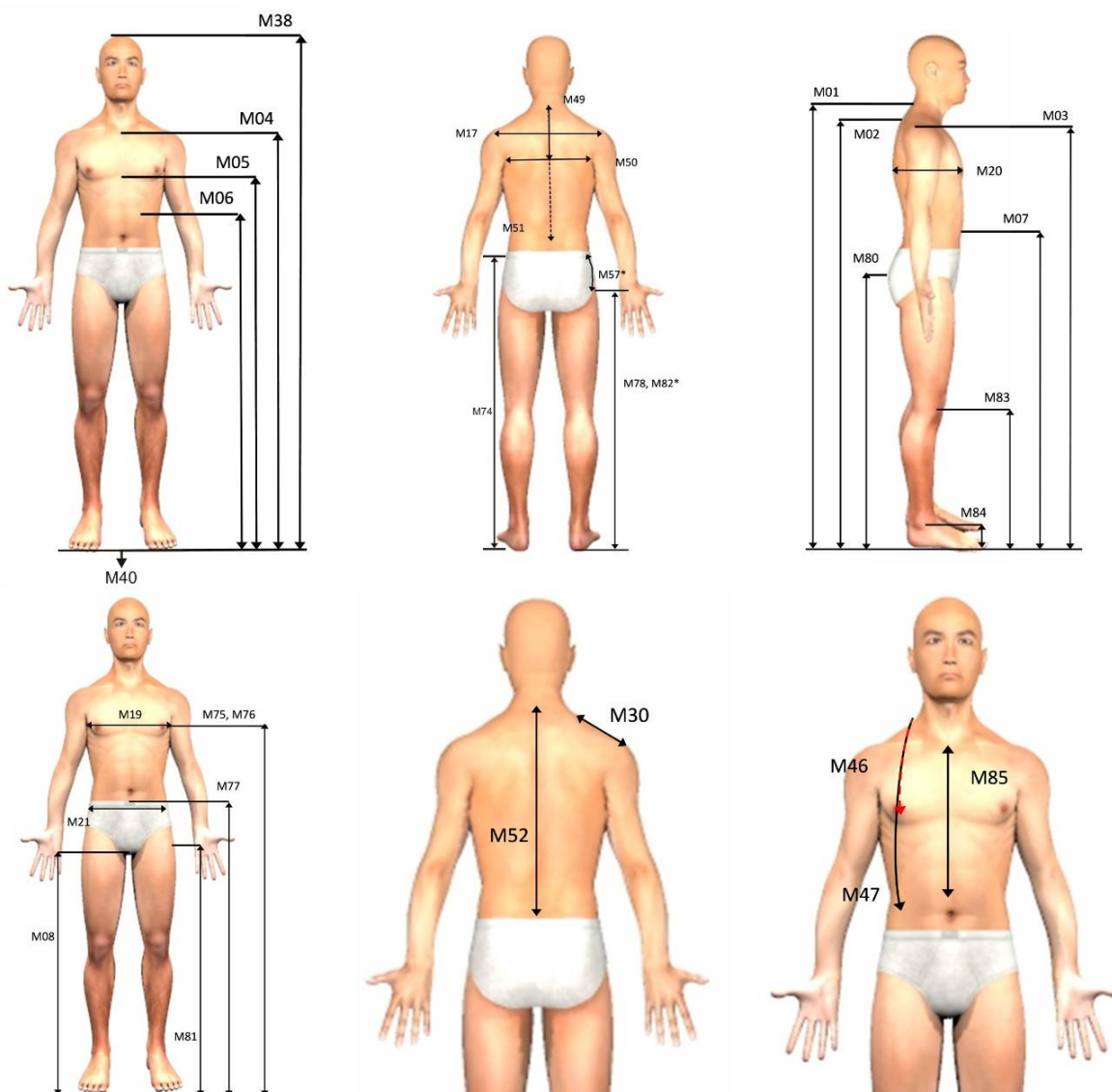


Figure 3 Whole body dimensions

Table 3 Whole body dimension names and page references

| # | Name | Page |
|-----|----------------------------------|------|
| M01 | Cervicale Height | 17 |
| M02 | T2 Height | 18 |
| M03 | Acromion Height | 19 |
| M04 | Suprasternale Height | 20 |
| M05 | Substernale Height | 21 |
| M06 | Tenth Rib Height | 22 |
| M07 | Iliocristale Height | 23 |
| M08 | Crotch Height | 24 |
| M17 | Biacromial Breadth | 33 |
| M19 | Chest Breadth | 35 |
| M20 | Chest Depth | 36 |
| M21 | Bicristale Breadth | 37 |
| M30 | Shoulder Length | 46 |
| M38 | Stature | 54 |
| M40 | Weight | 56 |
| M46 | Nape to Bustpoint Thelion Length | 62 |
| M47 | Nape to Waist over Bust | 63 |
| M49 | Scye Depth | 64 |
| M50 | Back Width | 65 |
| M51 | Back Length | 66 |
| M52 | Nape to Waist Centre Back | 67 |
| M57 | Waist-Hip Distance | 72 |
| M74 | Outside Leg Length | 89 |
| M75 | Chest Level | 90 |
| M76 | Bust Level | 90 |
| M77 | Waist Level Centre Front | 91 |
| M78 | Hip Level female | 92 |
| M80 | Seat Level | 94 |
| M81 | Trochanteric Height | 95 |
| M82 | Hip Level | 92 |
| M83 | Knee Level | 96 |
| M84 | Ankle Height | 97 |
| M85 | Front Length | 98 |

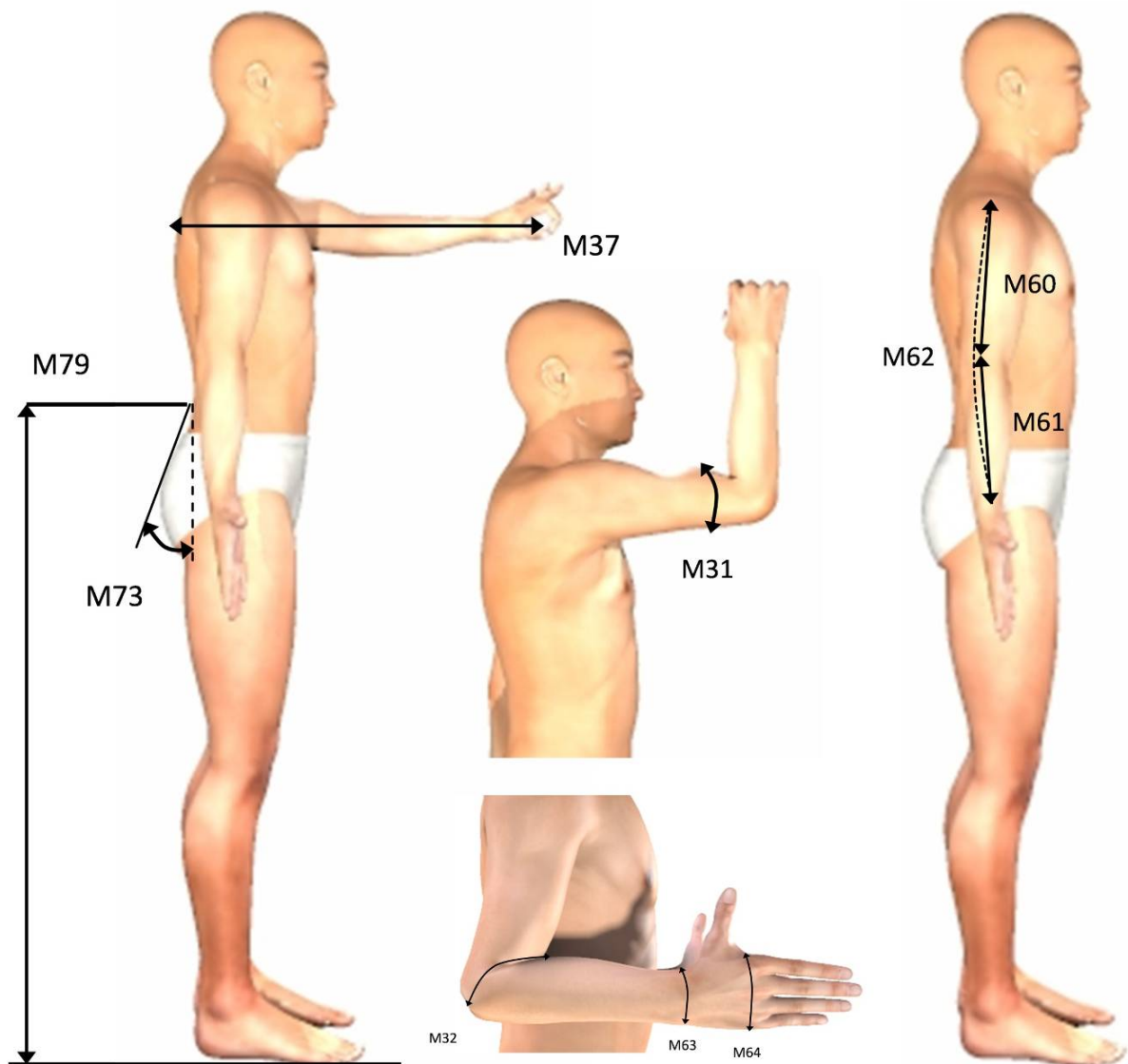


Figure 4 Limb dimensions

Table 4 Limb dimension names and page references

| # | Name | Page |
|-----|------------------------------|------|
| M31 | Biceps Circumference Flexed | 47 |
| M32 | Forearm Circumference Flexed | 48 |
| M37 | Thumbtip Reach | 53 |
| M60 | Acromion-Radiale Length | 75 |
| M61 | Radiale-Styleon Length | 76 |
| M62 | Sleeve Outseam | 77 |
| M63 | Wrist Circumference | 78 |
| M64 | Hand Circumference | 79 |
| M73 | Seat Angle | 88 |
| M79 | Waist Level Centre Back | 93 |

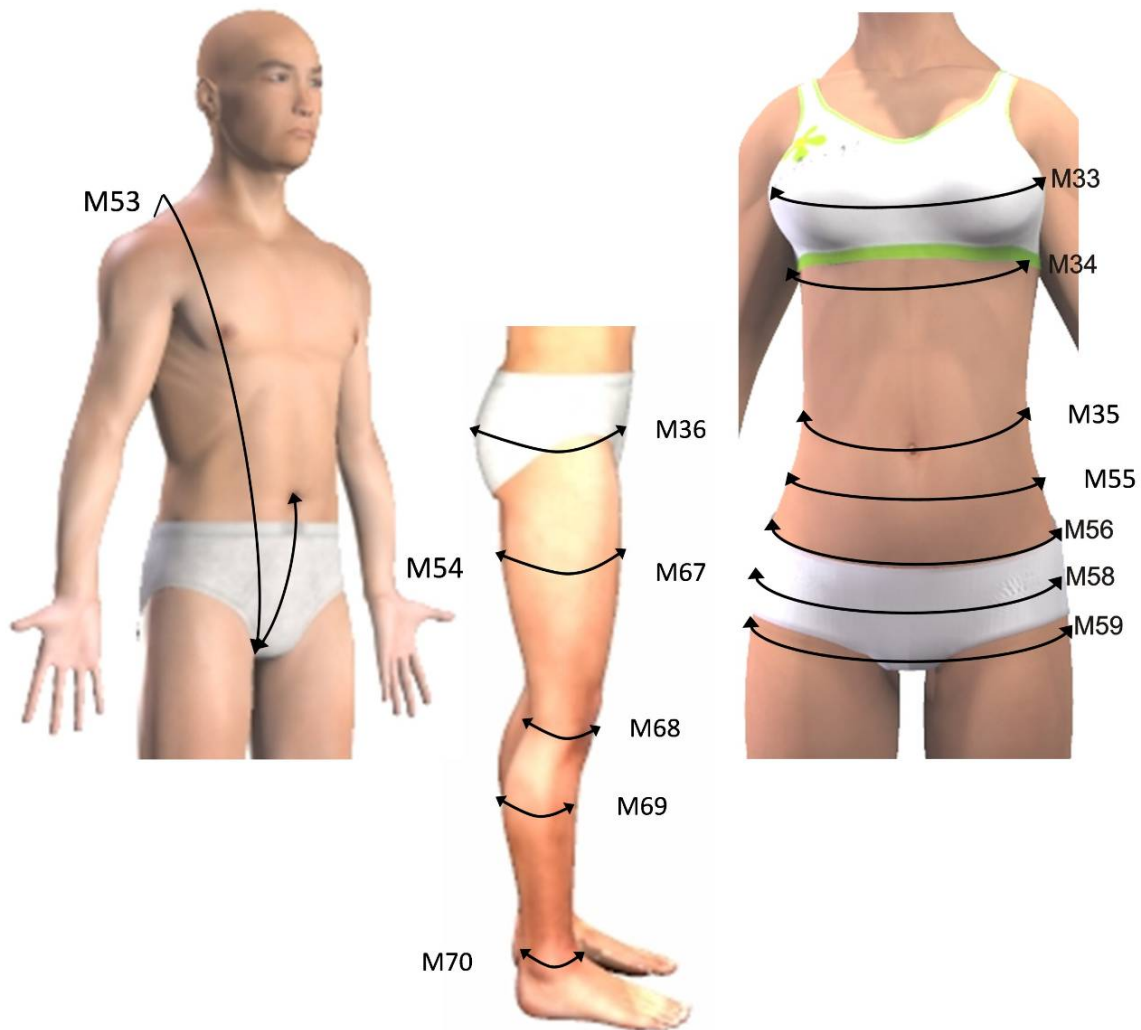


Figure 5 Body and limb circumference dimensions

Table 5 Body and limb circumference dimension names and page references

| # | Name | Page |
|-----|-----------------------------------|------|
| M33 | Chest Circumference | 49 |
| M34 | Chest Circumference Below Breast | 50 |
| M35 | Waist Circumference Omphalion | 51 |
| M36 | Buttock Circumference | 52 |
| M53 | Vertical Trunk Circumference Wide | 68 |
| M54 | Crotch Length Omphalion | 69 |
| M55 | Waist Circumference Preferred | 70 |
| M56 | Maximum Hip Circumference | 71 |
| M58 | High Hip | 73 |
| M59 | Hip Circumference | 74 |
| M67 | Thigh Circumference | 82 |
| M68 | Knee Circumference | 83 |
| M69 | Calf Circumference | 84 |
| M70 | Ankle Circumference | 85 |

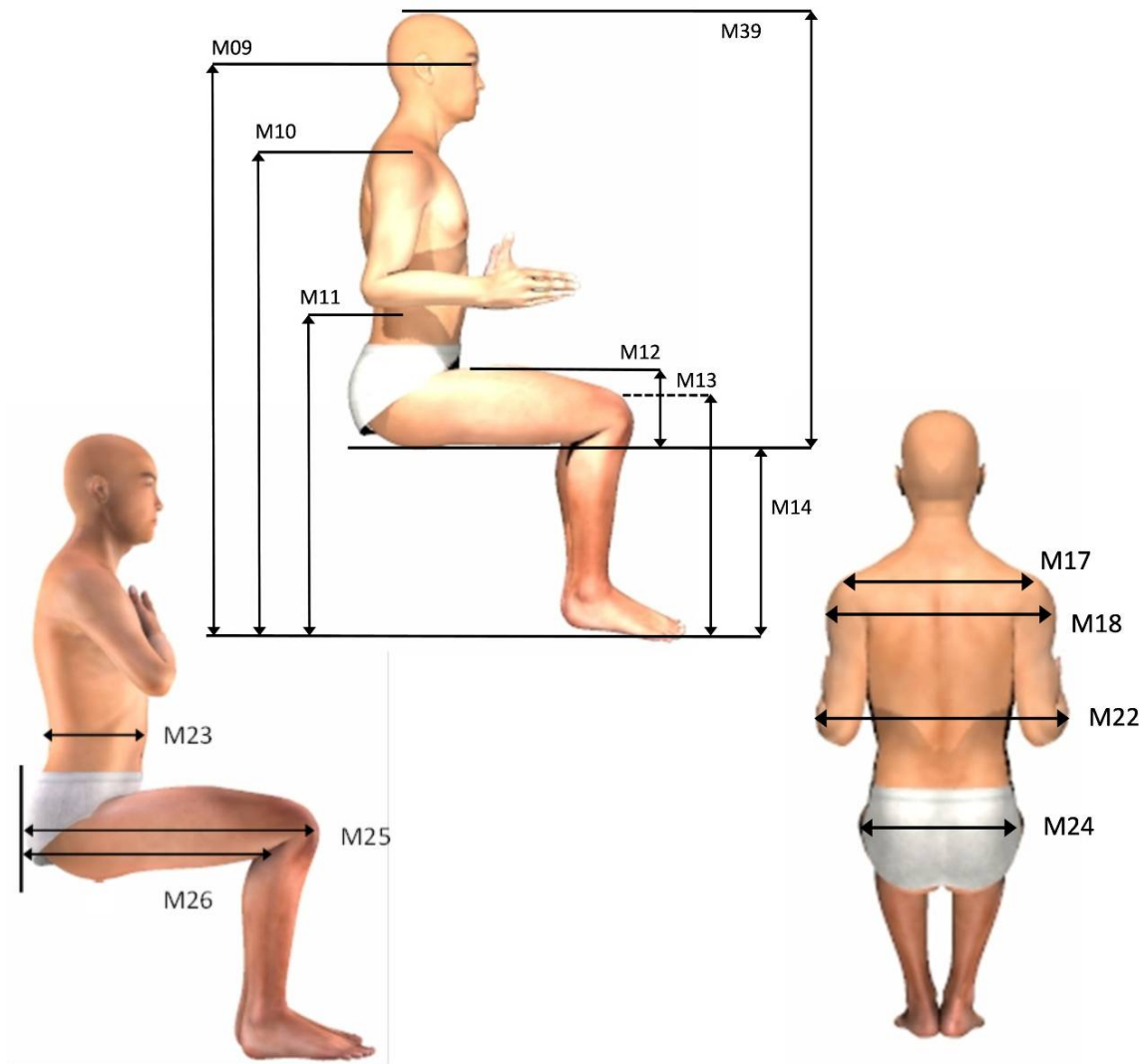


Figure 6 Seated dimensions

Table 6 Seated dimension names and page references

| # | Name | Page |
|-----|-----------------------------------|------|
| M09 | Eye Height Sitting | 25 |
| M10 | Acromion Height Sitting | 26 |
| M11 | Elbow Rest Height | 27 |
| M12 | Thigh Clearance | 28 |
| M13 | Knee Height Sitting | 29 |
| M14 | Popliteal Height | 30 |
| M17 | Biacromial Breadth | 33 |
| M18 | Bideltoid Breadth | 34 |
| M22 | Forearm-Forearm Breadth | 38 |
| M23 | Abdominal Extension Depth Sitting | 39 |
| M24 | Hip Breadth Sitting | 40 |
| M25 | Buttock-Knee Length | 41 |
| M26 | Buttock-Popliteal Length | 42 |
| M39 | Sitting Height | 55 |

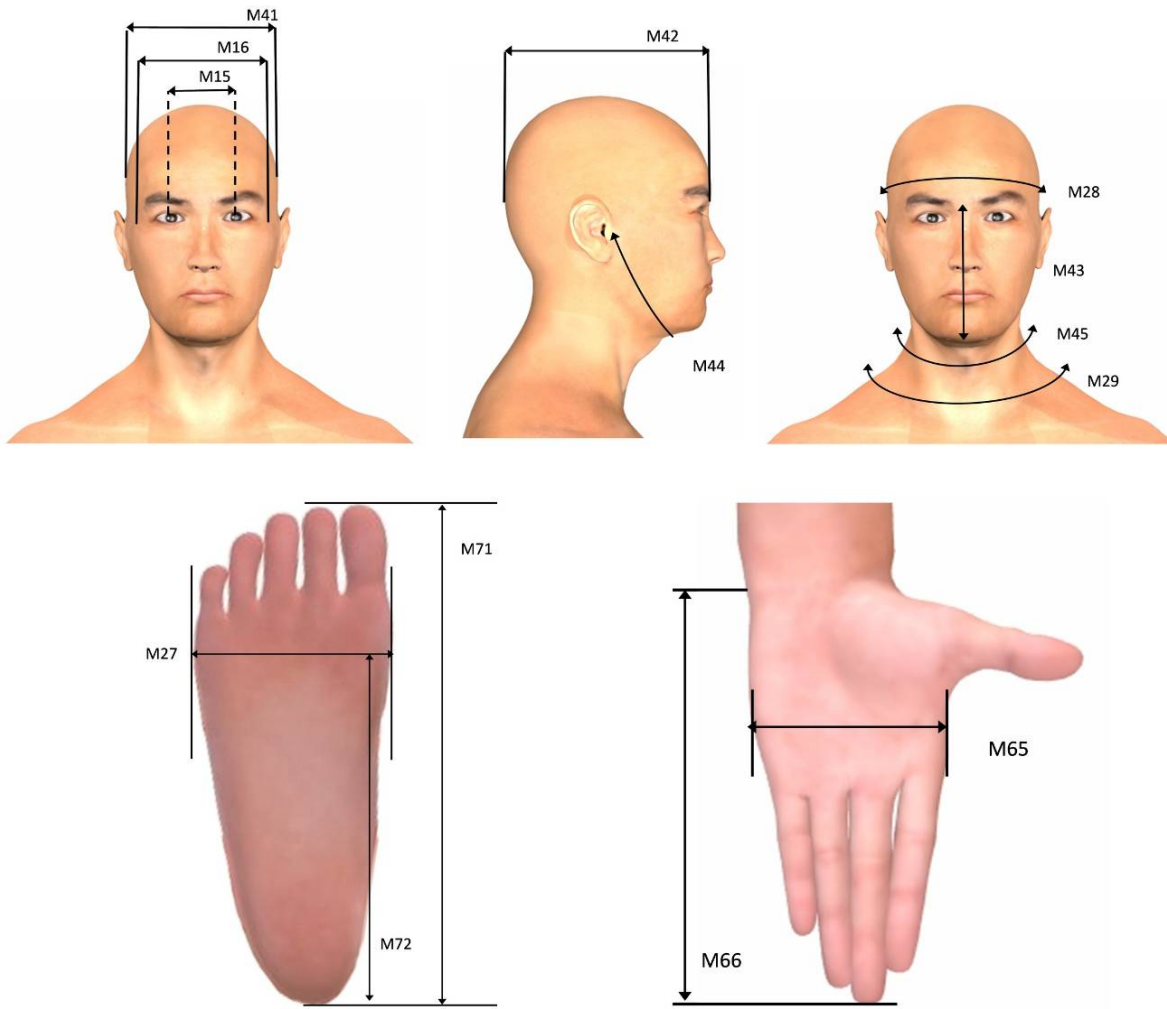


Figure 7 Head, hands and feet dimensions

Table 7 Head, hands and feet dimension names and page references

| # | Name | Page |
|-----|-----------------------------|------|
| M15 | Interpupillary Breadth | 31 |
| M16 | Bizygomatic Breadth | 32 |
| M27 | Foot Breadth | 43 |
| M28 | Head Circumference | 44 |
| M29 | Neck Circumference Base | 45 |
| M41 | Head Breadth | 57 |
| M42 | Head Length | 58 |
| M43 | Menton-Sellion Length | 59 |
| M44 | Bitrignon Submandibular Arc | 60 |
| M45 | Neck Circumference | 61 |
| M65 | Hand Breadth | 80 |
| M66 | Hand Length | 81 |
| M71 | Foot Length | 86 |
| M72 | Ball of Foot Length | 87 |

4.4 Summary Statistics

Summary statistics for each of the anthropometric measurements collected by the AWAS study are presented in this section. All landmarks used during the collection of these measurements are presented in Annex A. It should be noted that some standards use an estimate of the population to calculate various percentiles. This is not recommended for the data presented in this document, instead the percentile data presented in this section should be used.

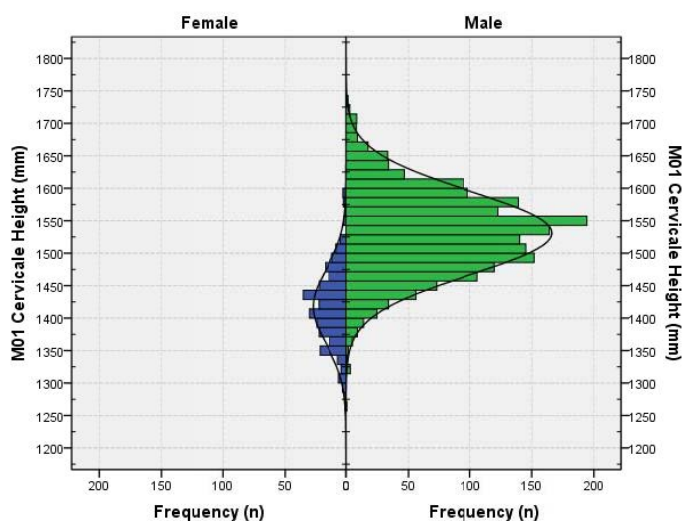
2138 of the participants sampled were asked about their handedness. 9.4% (n=201) self-reported themselves as being left handed. 1509 participants were asked about their rifle master-handedness. 9.6% (n=145) self-reported as using their left hand as their master-hand with their rifles.

4.4.1 Cervicale Height (M01)

Posture: Anthropometric Standing with the head in the Frankfort plane.

Definition: Standing surface to Cervicale.

| FEMALES | | MALES |
|---------|--------------------------|-------|
| 277 | n | 1861 |
| 1418 | Mean | 1531 |
| 3.5 | SE (mean) | 1.5 |
| 57.7 | SD | 63.8 |
| 1266 | Minimum | 1259 |
| 1599 | Maximum | 1735 |
| 0.272 | Skewness | 0.016 |
| 0.376 | Kurtosis | 0.170 |
| 4.1% | Coefficient of variation | 4.2% |
| | Percentiles | |
| 1287 | 1 st | 1383 |
| 1302 | 2 nd | 1401 |
| 1309 | 3 rd | 1411 |
| 1327 | 5 th | 1428 |
| 1346 | 10 th | 1451 |
| 1356 | 15 th | 1465 |
| 1368 | 20 th | 1477 |
| 1380 | 25 th | 1487 |
| 1387 | 30 th | 1496 |
| 1395 | 35 th | 1505 |
| 1400 | 40 th | 1514 |
| 1409 | 45 th | 1525 |
| 1418 | 50 th | 1532 |
| 1425 | 55 th | 1540 |
| 1433 | 60 th | 1549 |
| 1436 | 65 th | 1556 |
| 1444 | 70 th | 1563 |
| 1454 | 75 th | 1574 |
| 1465 | 80 th | 1583 |
| 1476 | 85 th | 1595 |
| 1490 | 90 th | 1609 |
| 1512 | 95 th | 1640 |
| 1523 | 97 th | 1654 |
| 1561 | 98 th | 1666 |
| 1593 | 99 th | 1692 |

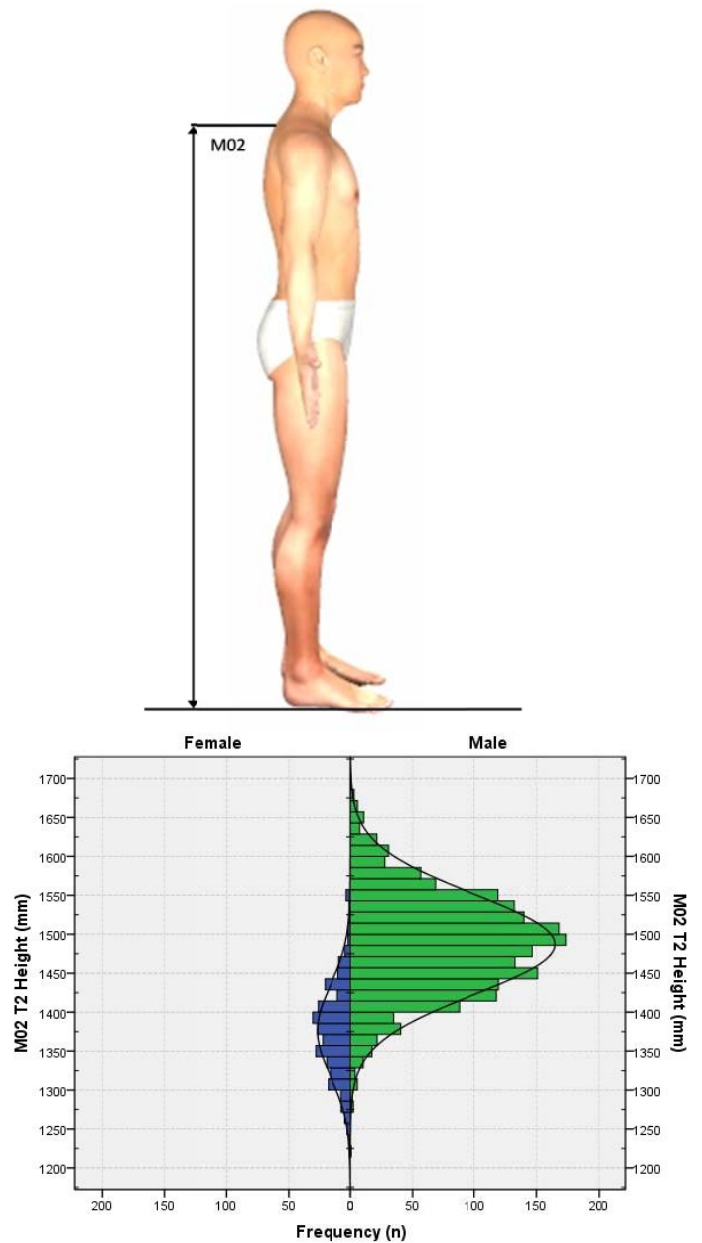


DSTO-TR-3006

4.4.2 T2 Height (M02)

Posture: Anthropometric Standing.**Definition:** Standing surface to T2.

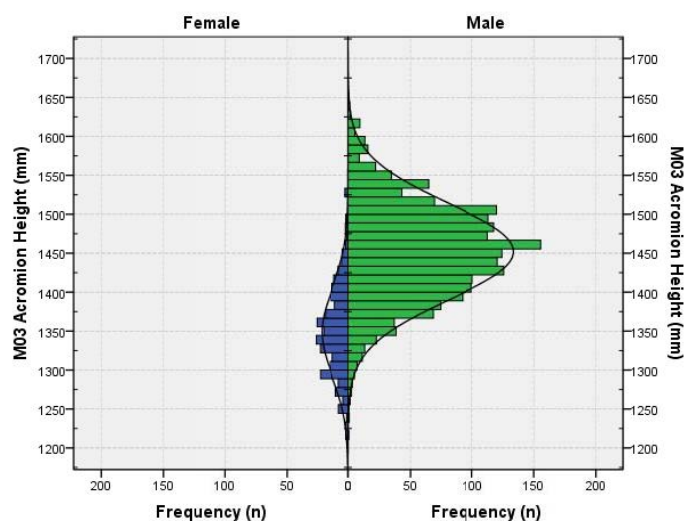
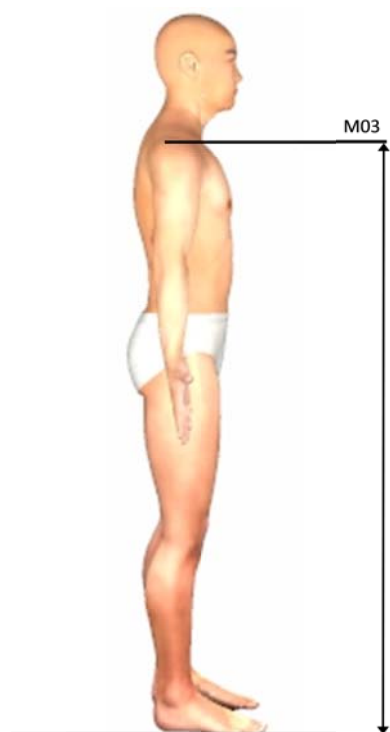
| FEMALES | | MALES |
|-------------|--------------------------|--------|
| 277 | n | 1860 |
| 1377 | Mean | 1487 |
| 3.5 | SE (mean) | 1.5 |
| 58.2 | SD | 64.3 |
| 1225 | Minimum | 1215 |
| 1554 | Maximum | 1686 |
| 0.266 | Skewness | -0.001 |
| 0.305 | Kurtosis | 0.151 |
| 4.2% | Coefficient of variation | 4.3% |
| Percentiles | | |
| 1251 | 1 st | 1336 |
| 1258 | 2 nd | 1354 |
| 1268 | 3 rd | 1366 |
| 1281 | 5 th | 1382 |
| 1302 | 10 th | 1408 |
| 1313 | 15 th | 1420 |
| 1327 | 20 th | 1431 |
| 1336 | 25 th | 1443 |
| 1348 | 30 th | 1453 |
| 1354 | 35 th | 1461 |
| 1361 | 40 th | 1471 |
| 1369 | 45 th | 1481 |
| 1377 | 50 th | 1489 |
| 1384 | 55 th | 1497 |
| 1391 | 60 th | 1504 |
| 1397 | 65 th | 1512 |
| 1405 | 70 th | 1520 |
| 1410 | 75 th | 1530 |
| 1425 | 80 th | 1540 |
| 1438 | 85 th | 1552 |
| 1450 | 90 th | 1566 |
| 1470 | 95 th | 1595 |
| 1491 | 97 th | 1611 |
| 1518 | 98 th | 1622 |
| 1551 | 99 th | 1650 |



4.4.3 Acromion Height (M03)

Posture: Anthropometric Standing.**Definition:** Standing surface to Acromion Right.

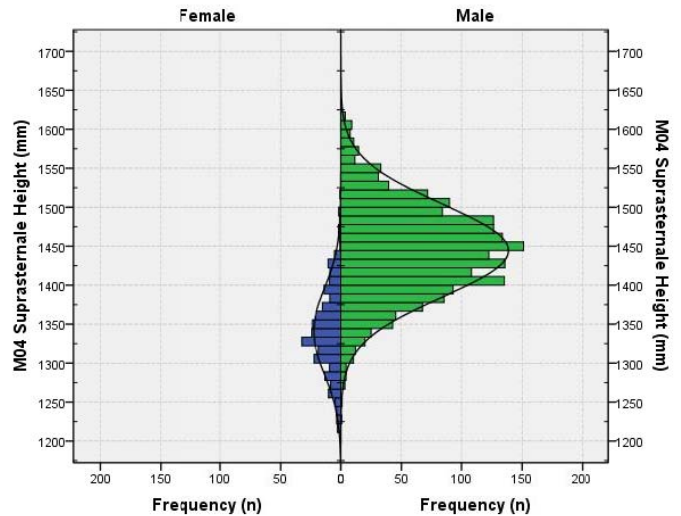
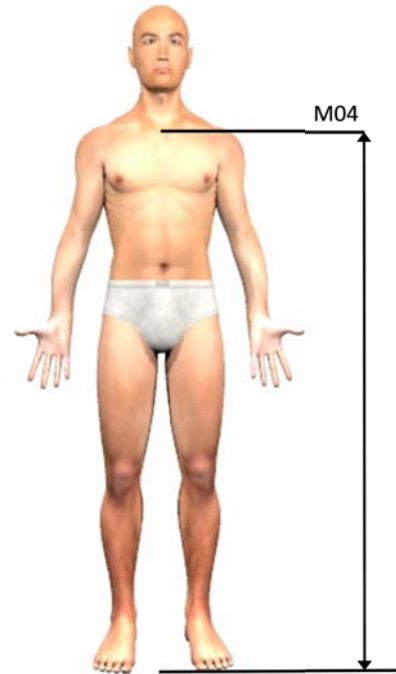
| FEMALES | | MALES |
|-------------|--------------------------|--------|
| 277 | n | 1861 |
| 1349 | Mean | 1452 |
| 3.4 | SE (mean) | 1.4 |
| 56.4 | SD | 61.7 |
| 1203 | Minimum | 1213 |
| 1533 | Maximum | 1645 |
| 0.303 | Skewness | -0.018 |
| 0.333 | Kurtosis | 0.078 |
| 4.2% | Coefficient of variation | 4.3% |
| Percentiles | | |
| 1219 | 1 st | 1310 |
| 1242 | 2 nd | 1325 |
| 1248 | 3 rd | 1338 |
| 1256 | 5 th | 1352 |
| 1280 | 10 th | 1375 |
| 1292 | 15 th | 1387 |
| 1297 | 20 th | 1398 |
| 1309 | 25 th | 1410 |
| 1320 | 30 th | 1420 |
| 1327 | 35 th | 1428 |
| 1334 | 40 th | 1437 |
| 1340 | 45 th | 1446 |
| 1347 | 50 th | 1455 |
| 1353 | 55 th | 1460 |
| 1360 | 60 th | 1468 |
| 1366 | 65 th | 1476 |
| 1372 | 70 th | 1486 |
| 1384 | 75 th | 1494 |
| 1397 | 80 th | 1503 |
| 1408 | 85 th | 1513 |
| 1418 | 90 th | 1532 |
| 1441 | 95 th | 1552 |
| 1459 | 97 th | 1573 |
| 1485 | 98 th | 1586 |
| 1514 | 99 th | 1602 |



4.4.4 Suprasternale Height (M04)

Posture: Anthropometric Standing.**Definition:** Standing surface to Suprasternale.

| FEMALES | | MALES |
|-------------|--------------------------|-------|
| 277 | n | 1861 |
| 1341 | Mean | 1444 |
| 3.3 | SE (mean) | 1.4 |
| 54.3 | SD | 59.5 |
| 1210 | Minimum | 1230 |
| 1521 | Maximum | 1633 |
| 0.214 | Skewness | 0.027 |
| 0.137 | Kurtosis | 0.072 |
| 4.1 % | Coefficient of variation | 4.1 % |
| Percentiles | | |
| 1215 | 1 st | 1304 |
| 1225 | 2 nd | 1323 |
| 1240 | 3 rd | 1332 |
| 1255 | 5 th | 1346 |
| 1272 | 10 th | 1370 |
| 1284 | 15 th | 1383 |
| 1298 | 20 th | 1396 |
| 1306 | 25 th | 1404 |
| 1313 | 30 th | 1412 |
| 1322 | 35 th | 1422 |
| 1326 | 40 th | 1429 |
| 1333 | 45 th | 1438 |
| 1337 | 50 th | 1445 |
| 1344 | 55 th | 1453 |
| 1349 | 60 th | 1459 |
| 1357 | 65 th | 1467 |
| 1364 | 70 th | 1476 |
| 1374 | 75 th | 1484 |
| 1388 | 80 th | 1493 |
| 1399 | 85 th | 1506 |
| 1416 | 90 th | 1519 |
| 1432 | 95 th | 1544 |
| 1440 | 97 th | 1557 |
| 1469 | 98 th | 1571 |
| 1489 | 99 th | 1593 |

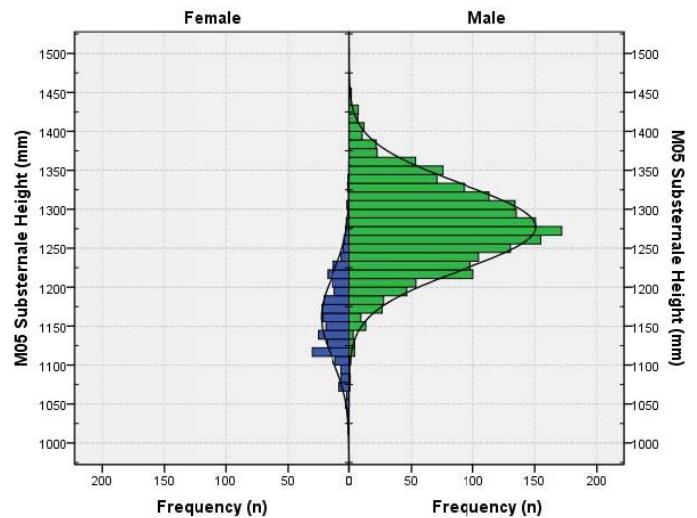
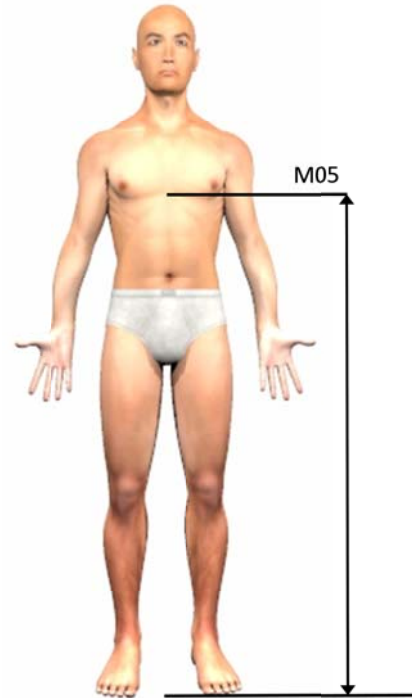


4.4.5 Substernale Height (M05)

Posture: Anthropometric Standing.

Definition: Standing surface to Substernale.

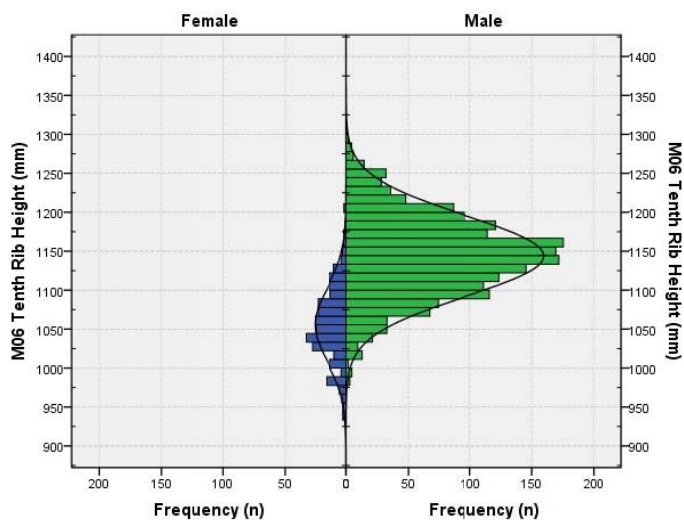
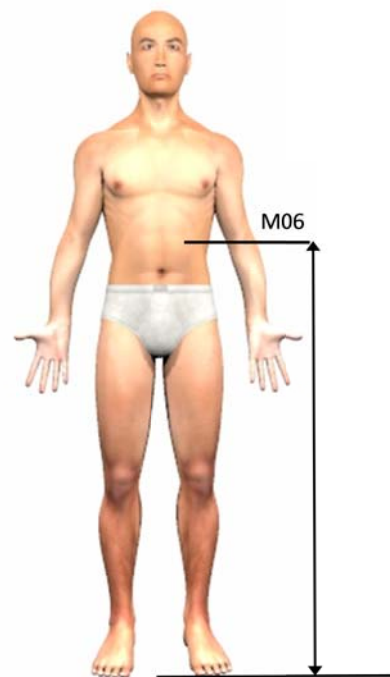
| FEMALES | | MALES |
|-------------|--------------------------|-------|
| 277 | n | 1861 |
| 1162 | Mean | 1277 |
| 3.2 | SE (mean) | 1.3 |
| 53.1 | SD | 54.7 |
| 1016 | Minimum | 1075 |
| 1342 | Maximum | 1454 |
| 0.322 | Skewness | 0.002 |
| 0.148 | Kurtosis | 0.151 |
| 4.6% | Coefficient of variation | 4.1% |
| Percentiles | | |
| 1046 | 1 st | 1149 |
| 1064 | 2 nd | 1164 |
| 1068 | 3 rd | 1175 |
| 1075 | 5 th | 1189 |
| 1100 | 10 th | 1210 |
| 1112 | 15 th | 1221 |
| 1118 | 20 th | 1231 |
| 1123 | 25 th | 1240 |
| 1130 | 30 th | 1249 |
| 1136 | 35 th | 1258 |
| 1141 | 40 th | 1264 |
| 1150 | 45 th | 1270 |
| 1160 | 50 th | 1276 |
| 1165 | 55 th | 1284 |
| 1172 | 60 th | 1290 |
| 1180 | 65 th | 1297 |
| 1187 | 70 th | 1305 |
| 1199 | 75 th | 1314 |
| 1209 | 80 th | 1323 |
| 1217 | 85 th | 1334 |
| 1231 | 90 th | 1347 |
| 1254 | 95 th | 1365 |
| 1272 | 97 th | 1379 |
| 1279 | 98 th | 1391 |
| 1306 | 99 th | 1412 |



4.4.6 Tenth Rib Height (M06)

Posture: Anthropometric Standing.**Definition:** Standing surface to Tenth Rib.

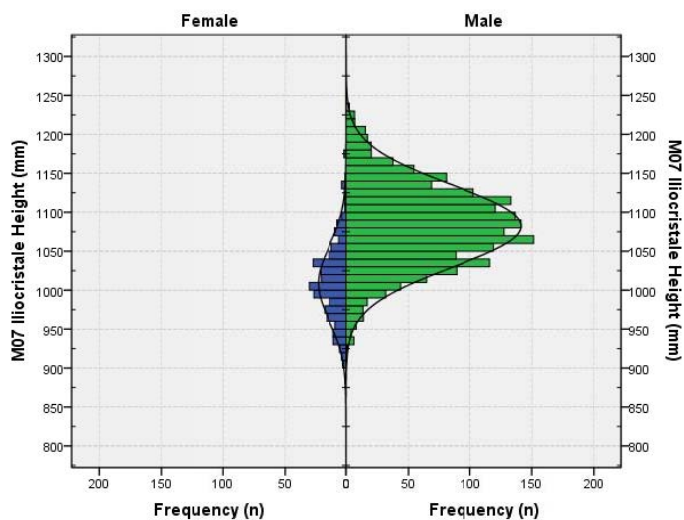
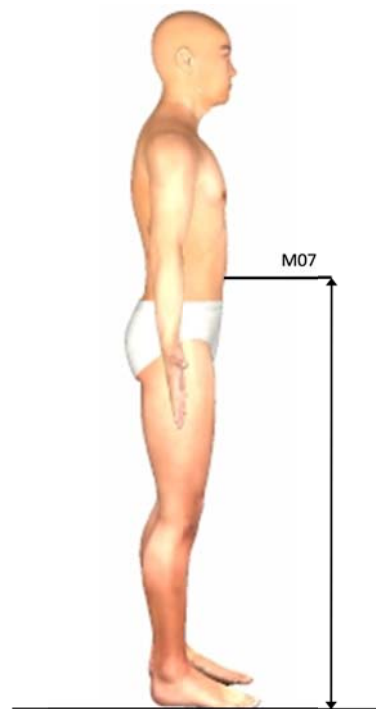
| FEMALES | | MALES |
|-------------|--------------------------|--------|
| 277 | n | 1860 |
| 1056 | Mean | 1144 |
| 2.9 | SE (mean) | 1.2 |
| 47.6 | SD | 51.7 |
| 939 | Minimum | 982 |
| 1206 | Maximum | 1311 |
| 0.134 | Skewness | -0.032 |
| 0.124 | Kurtosis | -0.009 |
| 4.5% | Coefficient of variation | 4.5% |
| Percentiles | | |
| 945 | 1 st | 1020 |
| 956 | 2 nd | 1035 |
| 967 | 3 rd | 1045 |
| 979 | 5 th | 1058 |
| 987 | 10 th | 1078 |
| 1008 | 15 th | 1091 |
| 1019 | 20 th | 1099 |
| 1027 | 25 th | 1109 |
| 1033 | 30 th | 1117 |
| 1038 | 35 th | 1125 |
| 1040 | 40 th | 1132 |
| 1049 | 45 th | 1139 |
| 1055 | 50 th | 1145 |
| 1059 | 55 th | 1149 |
| 1066 | 60 th | 1157 |
| 1072 | 65 th | 1163 |
| 1079 | 70 th | 1169 |
| 1085 | 75 th | 1178 |
| 1095 | 80 th | 1188 |
| 1108 | 85 th | 1196 |
| 1119 | 90 th | 1209 |
| 1133 | 95 th | 1232 |
| 1148 | 97 th | 1245 |
| 1164 | 98 th | 1251 |
| 1177 | 99 th | 1263 |



4.4.7 Iliocristale Height (M07)

Posture: Anthropometric Standing.**Definition:** Standing surface to Iliocristale.

| FEMALES | | MALES |
|-------------|--------------------------|--------|
| 277 | n | 1861 |
| 1009 | Mean | 1082 |
| 2.9 | SE (mean) | 1.2 |
| 47.9 | SD | 52.5 |
| 888 | Minimum | 912 |
| 1171 | Maximum | 1237 |
| 0.323 | Skewness | 0.034 |
| 0.477 | Kurtosis | -0.018 |
| 4.8% | Coefficient of variation | 4.9% |
| Percentiles | | |
| 903 | 1 st | 958 |
| 916 | 2 nd | 971 |
| 922 | 3 rd | 985 |
| 932 | 5 th | 998 |
| 943 | 10 th | 1016 |
| 959 | 15 th | 1027 |
| 969 | 20 th | 1037 |
| 978 | 25 th | 1046 |
| 984 | 30 th | 1054 |
| 994 | 35 th | 1062 |
| 998 | 40 th | 1068 |
| 1003 | 45 th | 1075 |
| 1006 | 50 th | 1083 |
| 1011 | 55 th | 1089 |
| 1019 | 60 th | 1095 |
| 1028 | 65 th | 1103 |
| 1032 | 70 th | 1110 |
| 1036 | 75 th | 1116 |
| 1045 | 80 th | 1126 |
| 1056 | 85 th | 1137 |
| 1073 | 90 th | 1149 |
| 1087 | 95 th | 1168 |
| 1110 | 97 th | 1186 |
| 1130 | 98 th | 1198 |
| 1146 | 99 th | 1207 |

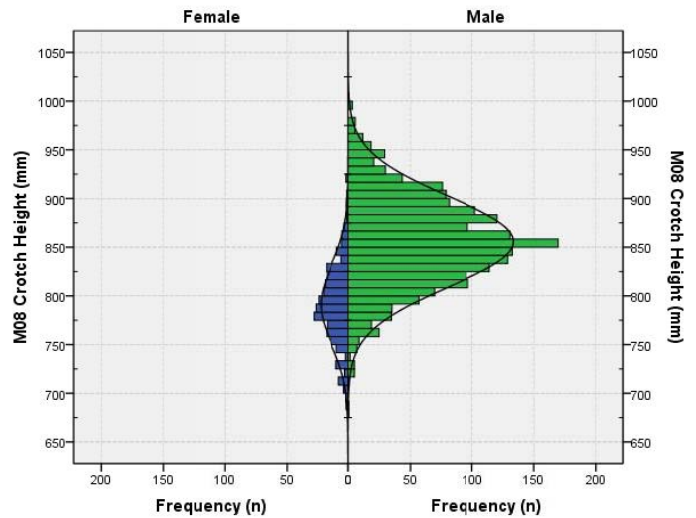
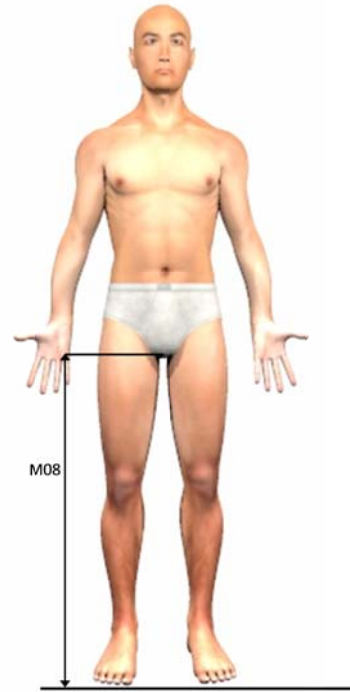


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4.4.8 Crotch Height (M08)

Posture: Anthropometric Standing.**Definition:** Standing surface to Crotch.

| FEMALES | | MALES |
|-------------|--------------------------|-------|
| 277 | n | 1861 |
| 791 | Mean | 856 |
| 2.5 | SE (mean) | 1.1 |
| 40.9 | SD | 46.3 |
| 688 | Minimum | 683 |
| 921 | Maximum | 1001 |
| 0.100 | Skewness | 0.010 |
| 0.393 | Kurtosis | 0.095 |
| 5.2% | Coefficient of variation | 5.4% |
| Percentiles | | |
| 696 | 1 st | 748 |
| 705 | 2 nd | 762 |
| 710 | 3 rd | 767 |
| 713 | 5 th | 778 |
| 738 | 10 th | 798 |
| 751 | 15 th | 809 |
| 760 | 20 th | 817 |
| 766 | 25 th | 825 |
| 773 | 30 th | 832 |
| 780 | 35 th | 838 |
| 782 | 40 th | 844 |
| 786 | 45 th | 850 |
| 790 | 50 th | 855 |
| 796 | 55 th | 860 |
| 800 | 60 th | 866 |
| 805 | 65 th | 873 |
| 811 | 70 th | 879 |
| 817 | 75 th | 887 |
| 823 | 80 th | 895 |
| 828 | 85 th | 905 |
| 843 | 90 th | 914 |
| 861 | 95 th | 934 |
| 868 | 97 th | 945 |
| 886 | 98 th | 953 |
| 901 | 99 th | 961 |

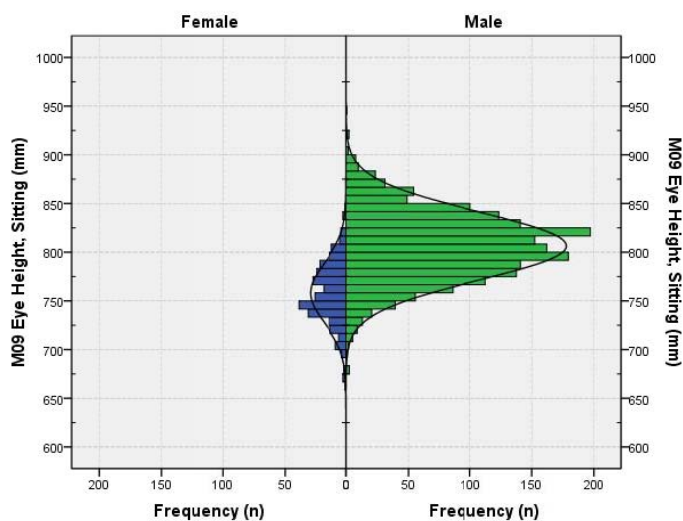
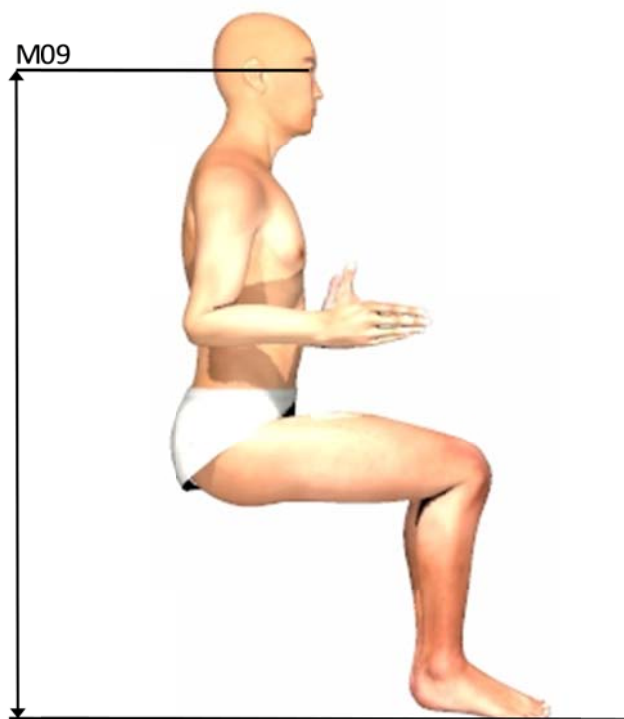


4.4.9 Eye Height, Sitting (M09)

Posture: Anthropometric Sitting with the head in the Frankfort plane.

Definition: Sitting surface to Ectocanthus.

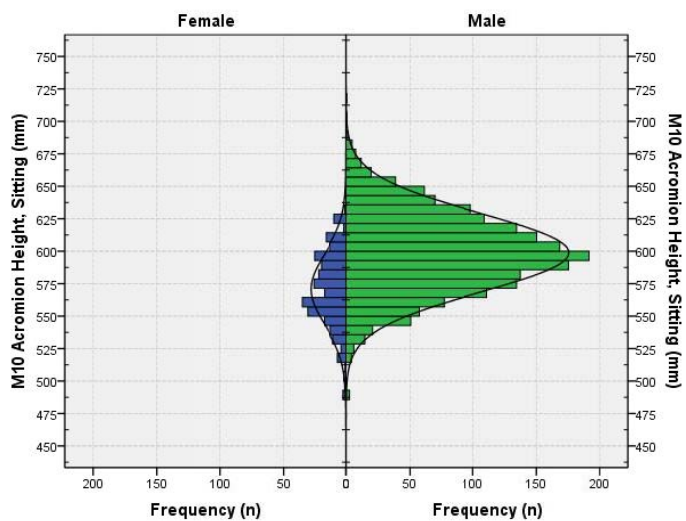
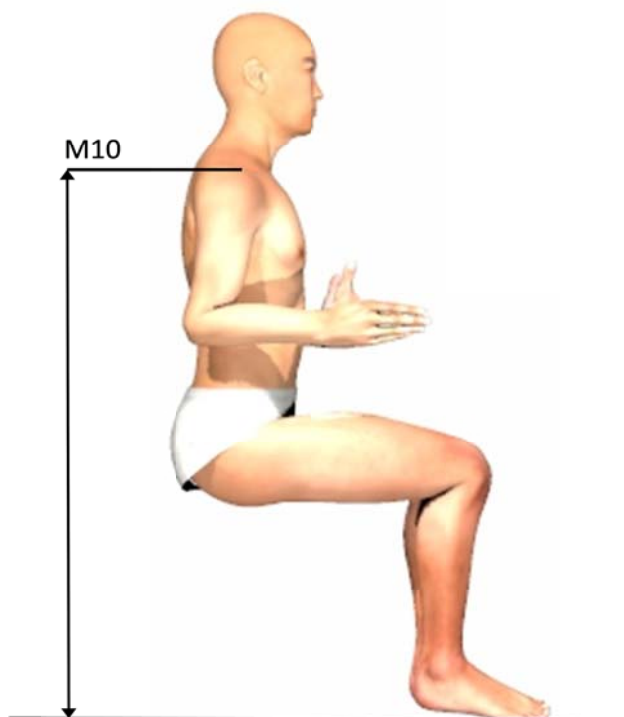
| FEMALES | | MALES |
|-------------|--------------------------|--------|
| 277 | n | 1861 |
| 758 | Mean | 806 |
| 1.9 | SE (mean) | 0.8 |
| 31.2 | SD | 34.8 |
| 666 | Minimum | 679 |
| 846 | Maximum | 942 |
| -0.104 | Skewness | -0.027 |
| 0.098 | Kurtosis | 0.139 |
| 4.1% | Coefficient of variation | 4.3% |
| Percentiles | | |
| 673 | 1 st | 722 |
| 689 | 2 nd | 734 |
| 696 | 3 rd | 742 |
| 706 | 5 th | 750 |
| 721 | 10 th | 762 |
| 728 | 15 th | 770 |
| 734 | 20 th | 777 |
| 739 | 25 th | 783 |
| 742 | 30 th | 787 |
| 744 | 35 th | 793 |
| 748 | 40 th | 798 |
| 752 | 45 th | 802 |
| 757 | 50 th | 806 |
| 761 | 55 th | 813 |
| 767 | 60 th | 816 |
| 773 | 65 th | 820 |
| 776 | 70 th | 825 |
| 781 | 75 th | 830 |
| 785 | 80 th | 835 |
| 790 | 85 th | 842 |
| 798 | 90 th | 849 |
| 808 | 95 th | 864 |
| 816 | 97 th | 871 |
| 821 | 98 th | 878 |
| 836 | 99 th | 886 |



4.4.10 Acromion Height, Sitting (M10)

Posture: Anthropometric Sitting.**Definition:** Sitting surface to Acromion (Right).

| FEMALES | | MALES |
|-------------|--------------------------|--------|
| 277 | n | 1858 |
| 571 | Mean | 599 |
| 1.7 | SE (mean) | 0.7 |
| 27.8 | SD | 30.2 |
| 487 | Minimum | 491 |
| 632 | Maximum | 716 |
| -0.204 | Skewness | 0.047 |
| -0.105 | Kurtosis | -0.016 |
| 4.9% | Coefficient of variation | 5.0% |
| Percentiles | | |
| 493 | 1 st | 532 |
| 508 | 2 nd | 538 |
| 515 | 3 rd | 543 |
| 526 | 5 th | 550 |
| 536 | 10 th | 561 |
| 544 | 15 th | 568 |
| 549 | 20 th | 573 |
| 552 | 25 th | 578 |
| 557 | 30 th | 583 |
| 559 | 35 th | 587 |
| 562 | 40 th | 591 |
| 565 | 45 th | 595 |
| 569 | 50 th | 598 |
| 574 | 55 th | 602 |
| 577 | 60 th | 606 |
| 583 | 65 th | 611 |
| 587 | 70 th | 614 |
| 592 | 75 th | 620 |
| 596 | 80 th | 624 |
| 601 | 85 th | 631 |
| 608 | 90 th | 639 |
| 613 | 95 th | 649 |
| 623 | 97 th | 655 |
| 625 | 98 th | 662 |
| 627 | 99 th | 667 |

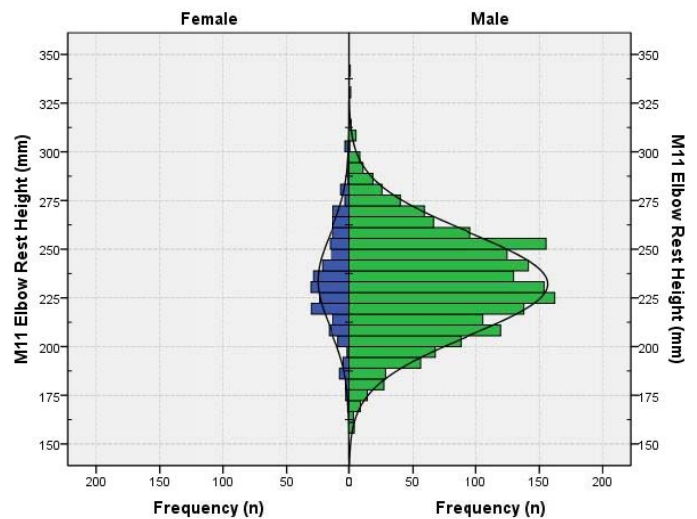
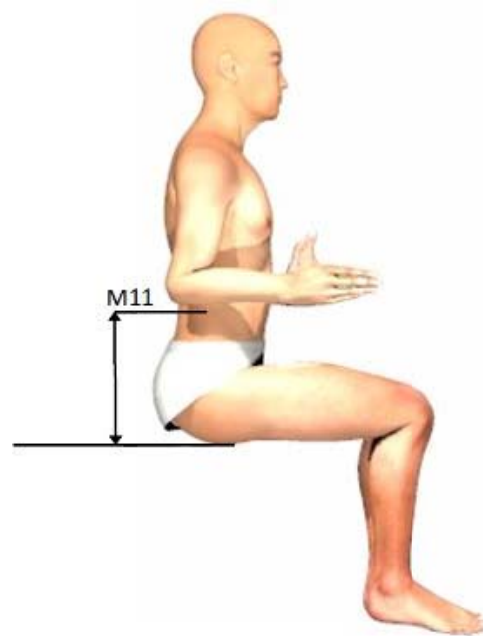


4.4.11 Elbow Rest Height (M11)

Posture: Anthropometric Sitting.

Definition: Sitting surface to Olecranon Bottom.

| FEMALES | | MALES |
|-------------|--------------------------|-------|
| 277 | n | 1861 |
| 234 | Mean | 232 |
| 1.5 | SE (mean) | 0.6 |
| 24.3 | SD | 26.3 |
| 169 | Minimum | 160 |
| 305 | Maximum | 344 |
| 0.079 | Skewness | 0.094 |
| 0.199 | Kurtosis | 0.028 |
| 10.4% | Coefficient of variation | 11.3% |
| Percentiles | | |
| 175 | 1 st | 173 |
| 181 | 2 nd | 179 |
| 185 | 3 rd | 182 |
| 188 | 5 th | 190 |
| 205 | 10 th | 198 |
| 210 | 15 th | 204 |
| 215 | 20 th | 210 |
| 220 | 25 th | 214 |
| 222 | 30 th | 219 |
| 224 | 35 th | 222 |
| 227 | 40 th | 225 |
| 230 | 45 th | 228 |
| 233 | 50 th | 232 |
| 235 | 55 th | 235 |
| 237 | 60 th | 239 |
| 240 | 65 th | 243 |
| 245 | 70 th | 246 |
| 249 | 75 th | 251 |
| 255 | 80 th | 254 |
| 261 | 85 th | 259 |
| 266 | 90 th | 266 |
| 276 | 95 th | 275 |
| 280 | 97 th | 282 |
| 283 | 98 th | 288 |
| 302 | 99 th | 295 |

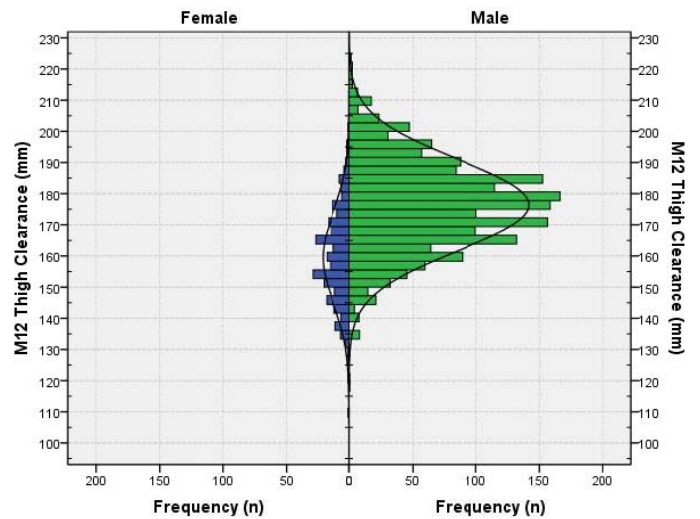
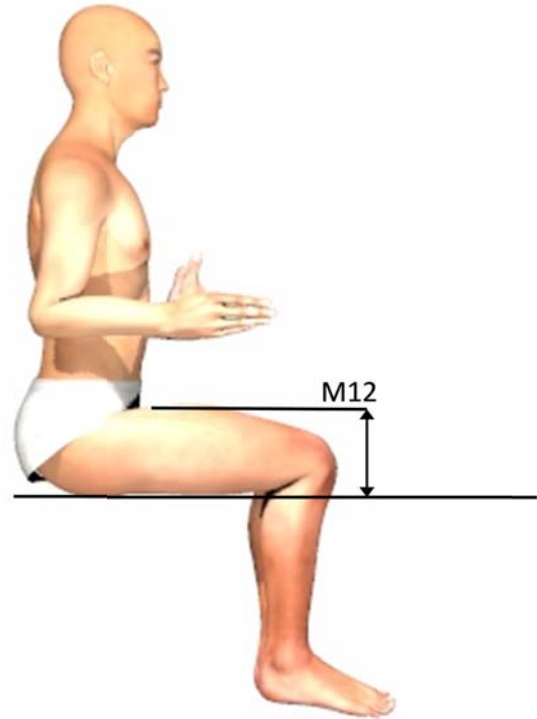


4.4.12 Thigh Clearance (M12)

Posture: Anthropometric Sitting, with the arms hanging relaxed.

Definition: Sitting surface to Thigh Point, Top.

| FEMALES | | MALES |
|-------------|--------------------------|-------|
| 277 | n | 1861 |
| 160 | Mean | 176 |
| 0.9 | SE (mean) | 0.3 |
| 14.4 | SD | 14.5 |
| 111 | Minimum | 119 |
| 202 | Maximum | 223 |
| 0.109 | Skewness | 0.007 |
| -0.124 | Kurtosis | 0.138 |
| 9.1% | Coefficient of variation | 8.2% |
| Percentiles | | |
| 129 | 1 st | 142 |
| 133 | 2 nd | 147 |
| 135 | 3 rd | 149 |
| 137 | 5 th | 153 |
| 141 | 10 th | 158 |
| 145 | 15 th | 161 |
| 147 | 20 th | 164 |
| 149 | 25 th | 166 |
| 152 | 30 th | 169 |
| 153 | 35 th | 171 |
| 155 | 40 th | 173 |
| 157 | 45 th | 175 |
| 159 | 50 th | 176 |
| 161 | 55 th | 178 |
| 164 | 60 th | 180 |
| 165 | 65 th | 182 |
| 167 | 70 th | 184 |
| 169 | 75 th | 186 |
| 172 | 80 th | 188 |
| 175 | 85 th | 191 |
| 180 | 90 th | 195 |
| 184 | 95 th | 201 |
| 187 | 97 th | 204 |
| 190 | 98 th | 207 |
| 194 | 99 th | 211 |

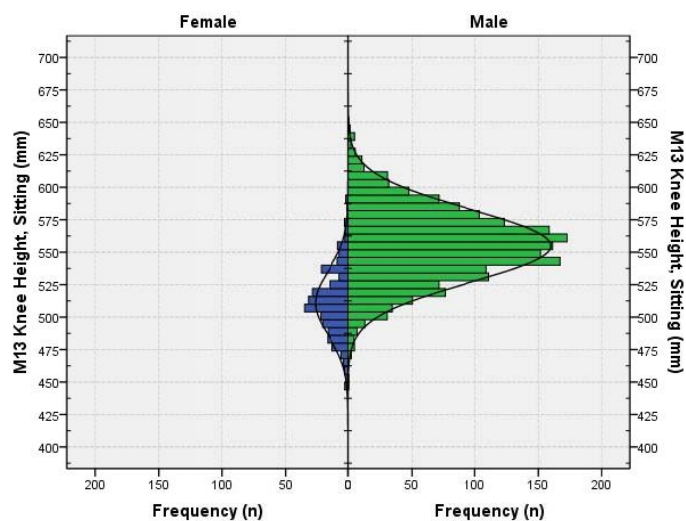
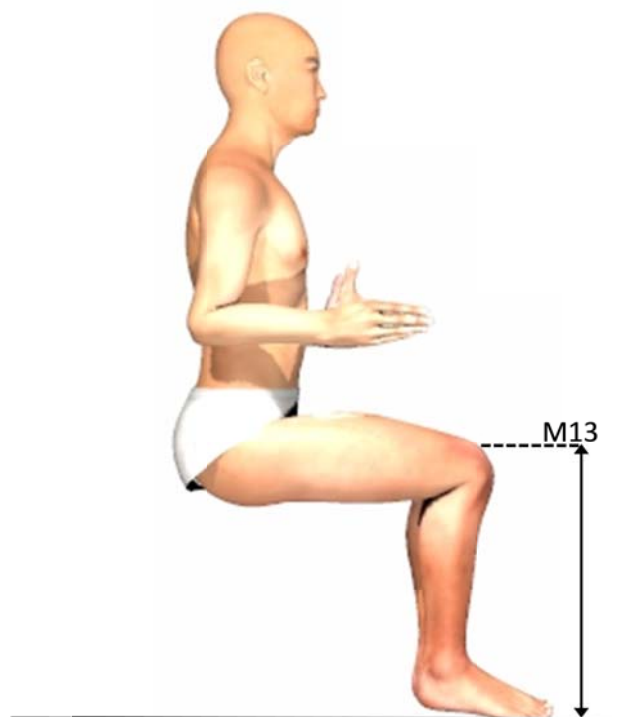


4.4.13 Knee Height, Sitting (M13)

Posture: Anthropometric Sitting, with the arms hanging relaxed.

Definition: Footrest surface to Suprapatella.

| FEMALES | | MALES |
|-------------|--------------------------|--------|
| 277 | n | 1861 |
| 511 | Mean | 555 |
| 1.5 | SE (mean) | 0.6 |
| 25.0 | SD | 27.9 |
| 446 | Minimum | 444 |
| 588 | Maximum | 650 |
| 0.256 | Skewness | -0.002 |
| 0.301 | Kurtosis | 0.183 |
| 4.9% | Coefficient of variation | 5.0% |
| Percentiles | | |
| 448 | 1 st | 489 |
| 458 | 2 nd | 499 |
| 466 | 3 rd | 502 |
| 474 | 5 th | 509 |
| 479 | 10 th | 519 |
| 484 | 15 th | 526 |
| 489 | 20 th | 532 |
| 495 | 25 th | 537 |
| 499 | 30 th | 541 |
| 502 | 35 th | 544 |
| 506 | 40 th | 548 |
| 508 | 45 th | 552 |
| 510 | 50 th | 555 |
| 513 | 55 th | 559 |
| 515 | 60 th | 562 |
| 517 | 65 th | 565 |
| 519 | 70 th | 569 |
| 525 | 75 th | 573 |
| 534 | 80 th | 578 |
| 537 | 85 th | 584 |
| 545 | 90 th | 590 |
| 556 | 95 th | 601 |
| 562 | 97 th | 608 |
| 570 | 98 th | 613 |
| 581 | 99 th | 622 |

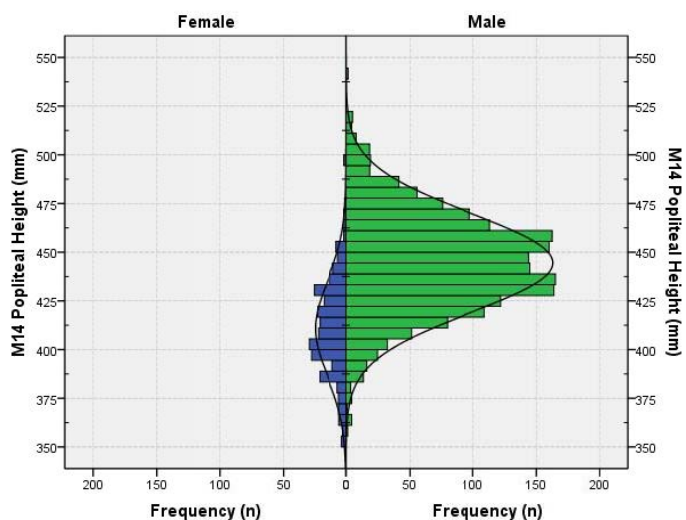
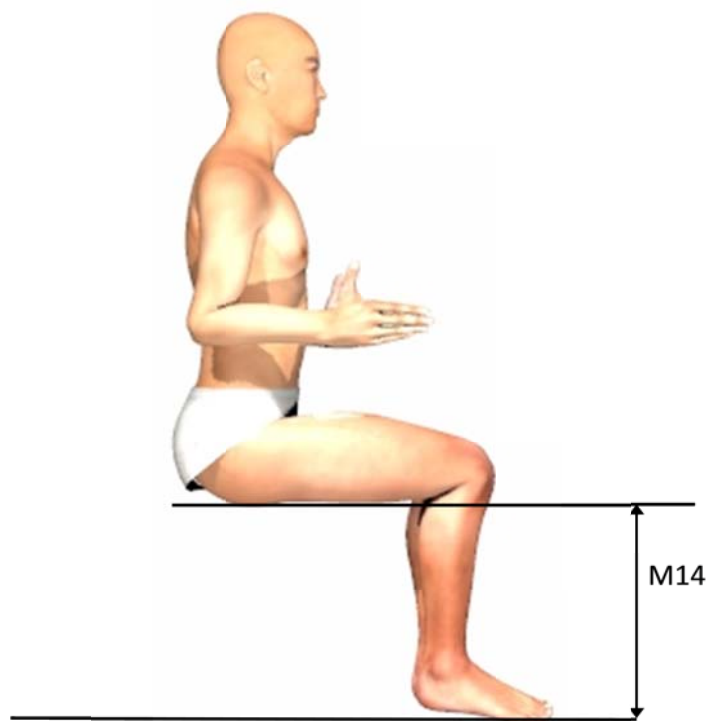


4.4.14 Popliteal Height (M14)

Posture: Anthropometric Sitting, with the arms hanging relaxed.

Definition: Footrest surface to the Dorsal Junction of Calf and Thigh.

| FEMALES | | MALES |
|-------------|--------------------------|-------|
| 277 | n | 1861 |
| 411 | Mean | 445 |
| 1.5 | SE (mean) | 0.6 |
| 24.6 | SD | 25.3 |
| 352 | Minimum | 359 |
| 499 | Maximum | 544 |
| 0.172 | Skewness | 0.065 |
| 0.394 | Kurtosis | 0.281 |
| 6.0% | Coefficient of variation | 5.7% |
| Percentiles | | |
| 353 | 1 st | 385 |
| 361 | 2 nd | 391 |
| 362 | 3 rd | 397 |
| 367 | 5 th | 404 |
| 381 | 10 th | 414 |
| 385 | 15 th | 419 |
| 389 | 20 th | 424 |
| 396 | 25 th | 428 |
| 398 | 30 th | 431 |
| 401 | 35 th | 434 |
| 404 | 40 th | 437 |
| 406 | 45 th | 441 |
| 410 | 50 th | 444 |
| 414 | 55 th | 447 |
| 417 | 60 th | 451 |
| 421 | 65 th | 455 |
| 425 | 70 th | 458 |
| 428 | 75 th | 461 |
| 431 | 80 th | 465 |
| 436 | 85 th | 471 |
| 441 | 90 th | 476 |
| 450 | 95 th | 486 |
| 456 | 97 th | 495 |
| 465 | 98 th | 500 |
| 475 | 99 th | 506 |

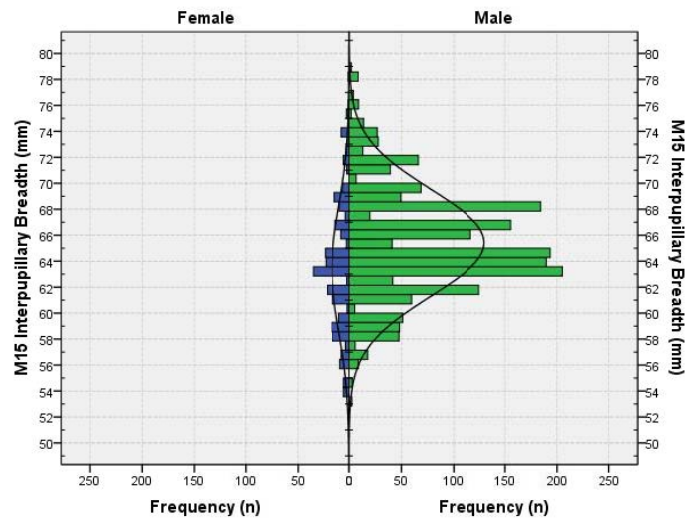
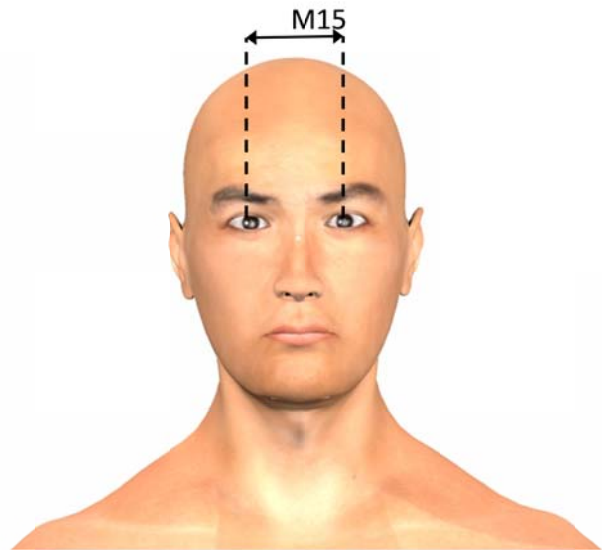


4.4.15 Interpupillary Breadth (M15)

Posture: Sitting.

Definition: Distance between the Centre of the Pupil (Right) and the Centre of the Pupil (Left).

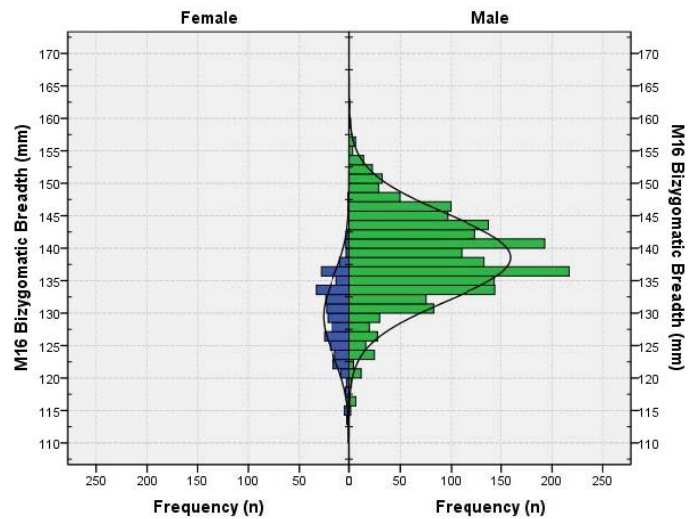
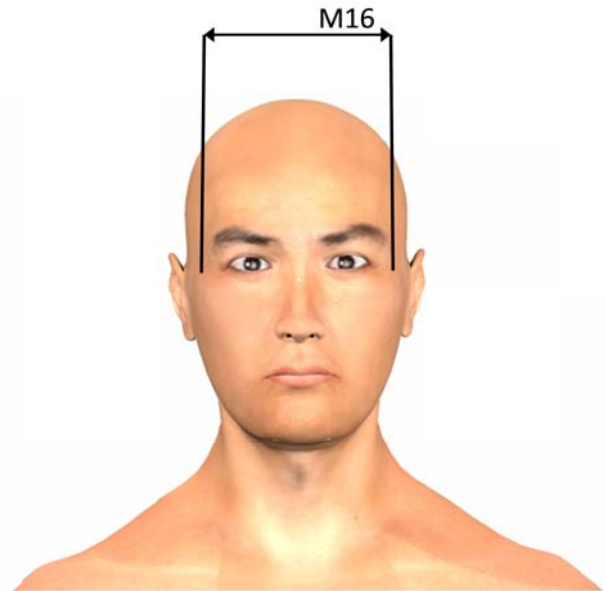
| FEMALES | | MALES |
|-------------|--------------------------|-------|
| 277 | n | 1861 |
| 63 | Mean | 65 |
| 0.3 | SE (mean) | 0.1 |
| 4.8 | SD | 4.1 |
| 54 | Minimum | 53 |
| 78 | Maximum | 79 |
| 0.374 | Skewness | 0.332 |
| -0.080 | Kurtosis | 0.296 |
| 7.5% | Coefficient of variation | 6.2% |
| Percentiles | | |
| 54 | 1 st | 57 |
| 54 | 2 nd | 58 |
| 55 | 3 rd | 58 |
| 56 | 5 th | 59 |
| 58 | 10 th | 60 |
| 58 | 15 th | 62 |
| 59 | 20 th | 62 |
| 60 | 25 th | 63 |
| 61 | 30 th | 63 |
| 62 | 35 th | 64 |
| 62 | 40 th | 64 |
| 63 | 45 th | 65 |
| 63 | 50 th | 65 |
| 64 | 55 th | 66 |
| 64 | 60 th | 66 |
| 65 | 65 th | 67 |
| 65 | 70 th | 67 |
| 66 | 75 th | 68 |
| 67 | 80 th | 68 |
| 69 | 85 th | 70 |
| 70 | 90 th | 71 |
| 73 | 95 th | 73 |
| 74 | 97 th | 74 |
| 74 | 98 th | 75 |
| 76 | 99 th | 76 |



4.4.16 Bizygomatic Breadth (M16)

Posture: Sitting.**Definition:** The maximum horizontal breadth between Zygion (Right) and Zygion (Left).

| FEMALES | | MALES |
|-------------|--------------------------|--------|
| 277 | n | 1861 |
| 129 | Mean | 139 |
| 0.4 | SE (mean) | 0.2 |
| 6.1 | SD | 6.7 |
| 111 | Minimum | 115 |
| 148 | Maximum | 162 |
| -0.316 | Skewness | -0.200 |
| 0.134 | Kurtosis | 0.466 |
| 4.7% | Coefficient of variation | 4.8% |
| Percentiles | | |
| 114 | 1 st | 121 |
| 115 | 2 nd | 123 |
| 116 | 3 rd | 125 |
| 119 | 5 th | 127 |
| 122 | 10 th | 131 |
| 123 | 15 th | 132 |
| 125 | 20 th | 134 |
| 125 | 25 th | 135 |
| 127 | 30 th | 135 |
| 127 | 35 th | 136 |
| 128 | 40 th | 137 |
| 129 | 45 th | 138 |
| 130 | 50 th | 139 |
| 131 | 55 th | 140 |
| 132 | 60 th | 140 |
| 132 | 65 th | 141 |
| 133 | 70 th | 142 |
| 134 | 75 th | 143 |
| 135 | 80 th | 144 |
| 136 | 85 th | 146 |
| 137 | 90 th | 147 |
| 138 | 95 th | 149 |
| 139 | 97 th | 151 |
| 141 | 98 th | 152 |
| 142 | 99 th | 154 |

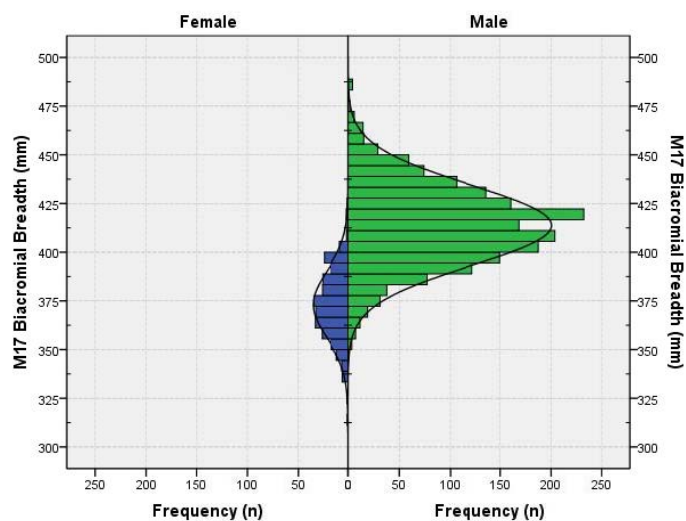
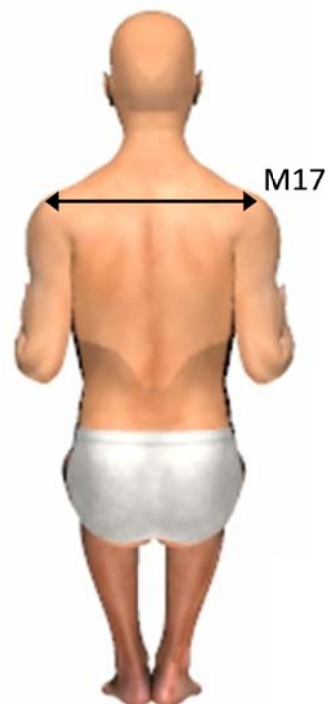


4.4.17 Biacromial Breadth (M17)

Posture: Anthropometric Sitting.

Definition: The distance between the Acromion (Right) and Acromion (Left).

| FEMALES | | MALES |
|-------------|--------------------------|-------|
| 277 | n | 1861 |
| 373 | Mean | 414 |
| 1.0 | SE (mean) | 0.5 |
| 17.4 | SD | 20.6 |
| 312 | Minimum | 348 |
| 424 | Maximum | 487 |
| -0.077 | Skewness | 0.093 |
| -0.079 | Kurtosis | 0.261 |
| 4.7% | Coefficient of variation | 5.0% |
| Percentiles | | |
| 336 | 1 st | 365 |
| 338 | 2 nd | 370 |
| 340 | 3 rd | 375 |
| 344 | 5 th | 382 |
| 351 | 10 th | 389 |
| 355 | 15 th | 393 |
| 359 | 20 th | 396 |
| 361 | 25 th | 400 |
| 364 | 30 th | 403 |
| 365 | 35 th | 406 |
| 369 | 40 th | 409 |
| 371 | 45 th | 411 |
| 373 | 50 th | 414 |
| 375 | 55 th | 417 |
| 377 | 60 th | 419 |
| 380 | 65 th | 421 |
| 382 | 70 th | 424 |
| 386 | 75 th | 427 |
| 389 | 80 th | 431 |
| 393 | 85 th | 435 |
| 398 | 90 th | 440 |
| 399 | 95 th | 448 |
| 402 | 97 th | 452 |
| 405 | 98 th | 457 |
| 416 | 99 th | 466 |

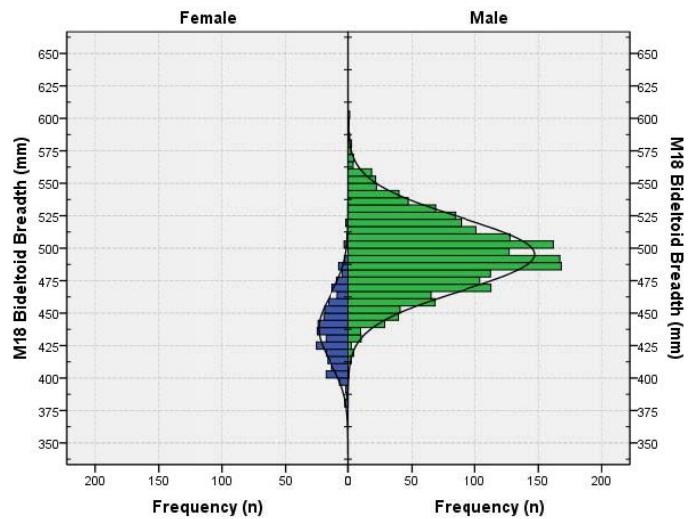
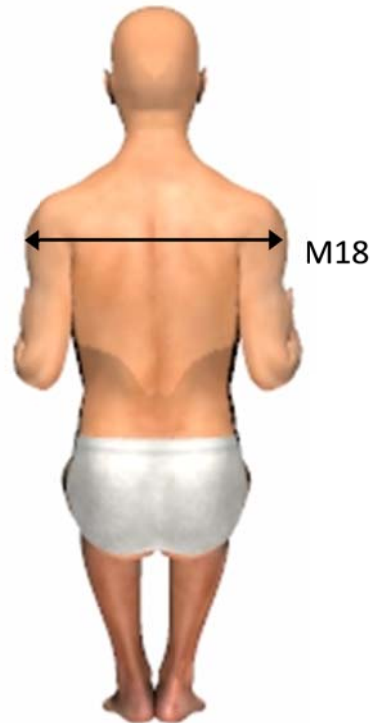


4.4.18 Bideltoid Breadth (M18)

Posture: Anthropometric Sitting.

Definition: The distance between the lateral margins of the upper arms on the deltoid muscle.

| FEMALES | | MALES |
|-------------|--------------------------|-------|
| 277 | n | 1861 |
| 438 | Mean | 495 |
| 1.6 | SE (mean) | 0.7 |
| 25.8 | SD | 28.0 |
| 380 | Minimum | 405 |
| 519 | Maximum | 605 |
| 0.404 | Skewness | 0.146 |
| -0.050 | Kurtosis | 0.132 |
| 5.9% | Coefficient of variation | 5.7% |
| Percentiles | | |
| 384 | 1 st | 432 |
| 394 | 2 nd | 440 |
| 395 | 3 rd | 444 |
| 400 | 5 th | 449 |
| 405 | 10 th | 460 |
| 410 | 15 th | 467 |
| 414 | 20 th | 472 |
| 420 | 25 th | 476 |
| 424 | 30 th | 481 |
| 426 | 35 th | 485 |
| 430 | 40 th | 487 |
| 434 | 45 th | 491 |
| 437 | 50 th | 494 |
| 440 | 55 th | 498 |
| 443 | 60 th | 501 |
| 446 | 65 th | 505 |
| 450 | 70 th | 509 |
| 454 | 75 th | 514 |
| 459 | 80 th | 519 |
| 467 | 85 th | 525 |
| 474 | 90 th | 532 |
| 486 | 95 th | 542 |
| 489 | 97 th | 550 |
| 499 | 98 th | 555 |
| 506 | 99 th | 561 |

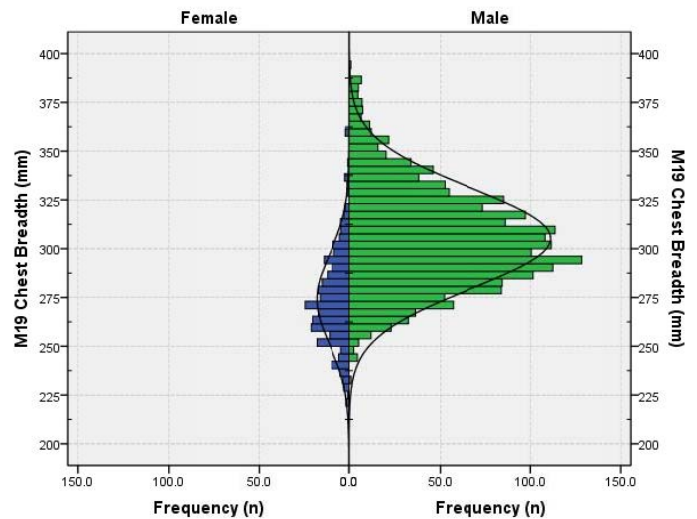


4.4.19 Chest Breadth (M19)

Posture: Anthropometric Standing, with the arms slightly abducted.

Definition: The maximum horizontal breadth at the height of Bustpoint, Right (females) or Thelion, Right (males).

| FEMALES | | MALES |
|-------------|--------------------------|-------|
| 277 | n | 1860 |
| 274 | Mean | 305 |
| 1.4 | SE (mean) | 0.6 |
| 23.3 | SD | 25.7 |
| 223 | Minimum | 234 |
| 359 | Maximum | 394 |
| 0.591 | Skewness | 0.481 |
| 0.805 | Kurtosis | 0.200 |
| 8.5% | Coefficient of variation | 8.4% |
| Percentiles | | |
| 227 | 1 st | 255 |
| 231 | 2 nd | 260 |
| 234 | 3 rd | 263 |
| 237 | 5 th | 267 |
| 246 | 10 th | 274 |
| 252 | 15 th | 280 |
| 254 | 20 th | 284 |
| 258 | 25 th | 287 |
| 261 | 30 th | 290 |
| 264 | 35 th | 294 |
| 268 | 40 th | 297 |
| 269 | 45 th | 300 |
| 272 | 50 th | 303 |
| 275 | 55 th | 306 |
| 277 | 60 th | 310 |
| 281 | 65 th | 313 |
| 283 | 70 th | 317 |
| 288 | 75 th | 322 |
| 294 | 80 th | 325 |
| 298 | 85 th | 332 |
| 303 | 90 th | 340 |
| 314 | 95 th | 351 |
| 323 | 97 th | 361 |
| 335 | 98 th | 366 |
| 348 | 99 th | 377 |



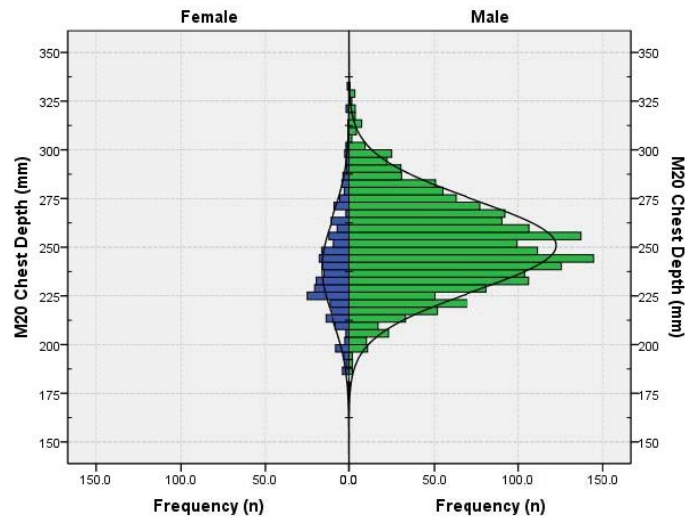
4.4.20 Chest Depth (M20)

Posture: Anthropometric Standing.

Definition: The horizontal distance between the Bustpoint, Right (females) or Thelion, Right (males), and point on the back at the same level.



| FEMALES | | MALES |
|-------------|--------------------------|-------|
| 277 | n | 1861 |
| 239 | Mean | 251 |
| 1.5 | SE (mean) | 0.5 |
| 25.5 | SD | 23.3 |
| 180 | Minimum | 178 |
| 334 | Maximum | 335 |
| 0.624 | Skewness | 0.258 |
| 0.827 | Kurtosis | 0.090 |
| 10.7% | Coefficient of variation | 9.3% |
| Percentiles | | |
| 188 | 1 st | 201 |
| 190 | 2 nd | 205 |
| 196 | 3 rd | 210 |
| 200 | 5 th | 215 |
| 211 | 10 th | 222 |
| 215 | 15 th | 227 |
| 221 | 20 th | 231 |
| 224 | 25 th | 235 |
| 225 | 30 th | 238 |
| 229 | 35 th | 241 |
| 230 | 40 th | 244 |
| 234 | 45 th | 247 |
| 235 | 50 th | 250 |
| 239 | 55 th | 253 |
| 243 | 60 th | 256 |
| 246 | 65 th | 259 |
| 250 | 70 th | 262 |
| 254 | 75 th | 266 |
| 258 | 80 th | 270 |
| 265 | 85 th | 275 |
| 273 | 90 th | 282 |
| 286 | 95 th | 290 |
| 297 | 97 th | 298 |
| 302 | 98 th | 300 |
| 320 | 99 th | 314 |

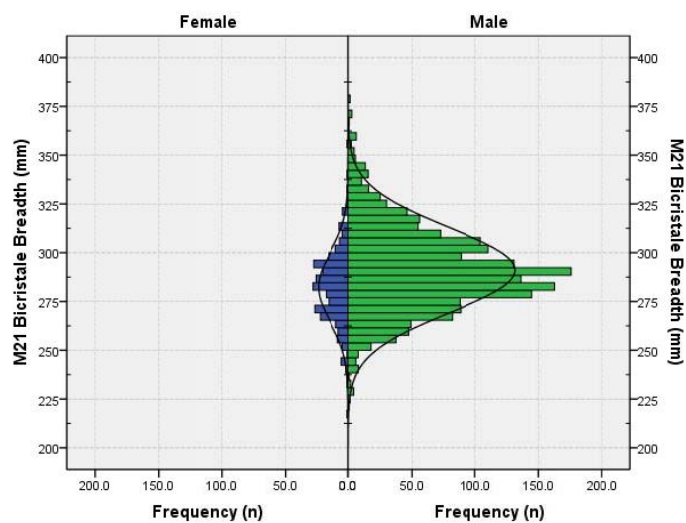
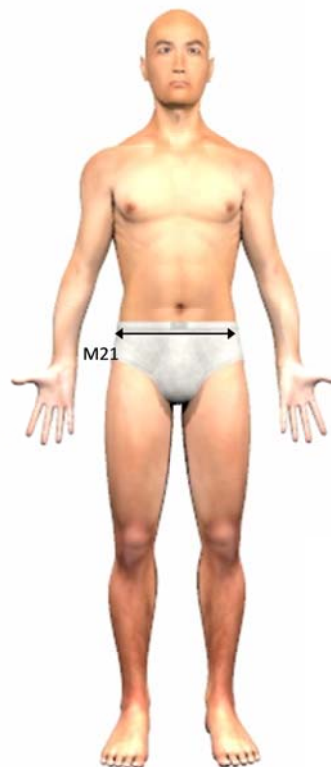


4.4.21 Bicristale Breadth (M21)

Posture: Anthropometric Standing, with the arms placed across the chest.

Definition: The distance between the most lateral points on the right and left iliac crests, immediately below the Iliocristale (Right) and Iliocristale (Left) landmarks.

| FEMALES | | MALES |
|-------------|--------------------------|-------|
| 277 | n | 1861 |
| 282 | Mean | 291 |
| 1.1 | SE (mean) | 0.5 |
| 17.7 | SD | 21.7 |
| 216 | Minimum | 221 |
| 357 | Maximum | 381 |
| 0.086 | Skewness | 0.425 |
| 1.118 | Kurtosis | 0.782 |
| 6.3% | Coefficient of variation | 7.5% |
| Percentiles | | |
| 239 | 1 st | 242 |
| 244 | 2 nd | 251 |
| 246 | 3 rd | 254 |
| 254 | 5 th | 258 |
| 261 | 10 th | 266 |
| 266 | 15 th | 270 |
| 269 | 20 th | 274 |
| 270 | 25 th | 277 |
| 272 | 30 th | 280 |
| 275 | 35 th | 282 |
| 277 | 40 th | 285 |
| 281 | 45 th | 287 |
| 284 | 50 th | 290 |
| 285 | 55 th | 291 |
| 287 | 60 th | 295 |
| 289 | 65 th | 297 |
| 291 | 70 th | 300 |
| 294 | 75 th | 304 |
| 296 | 80 th | 307 |
| 298 | 85 th | 313 |
| 303 | 90 th | 319 |
| 313 | 95 th | 330 |
| 315 | 97 th | 339 |
| 322 | 98 th | 343 |
| 329 | 99 th | 350 |

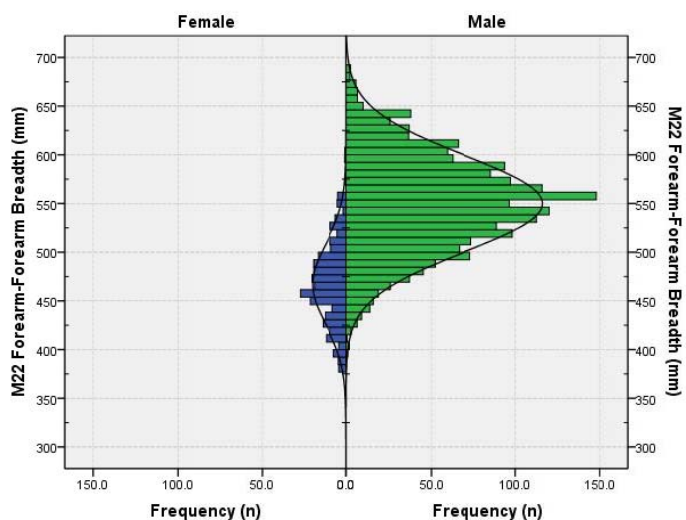
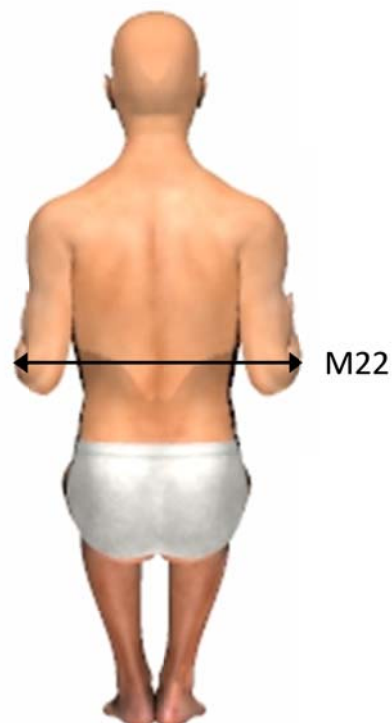


4.4.22 Forearm-Forearm Breadth (M22)

Posture: Anthropometric Sitting.

Definition: The maximum horizontal distance between the most lateral points on the right and lateral left forearms.

| FEMALES | | MALES |
|-------------|--------------------------|--------|
| 277 | n | 1861 |
| 467 | Mean | 550 |
| 2.5 | SE (mean) | 1.1 |
| 41.7 | SD | 49.2 |
| 361 | Minimum | 399 |
| 604 | Maximum | 692 |
| 0.180 | Skewness | -0.055 |
| -0.022 | Kurtosis | -0.193 |
| 8.9% | Coefficient of variation | 8.9% |
| Percentiles | | |
| 380 | 1 st | 434 |
| 386 | 2 nd | 447 |
| 389 | 3 rd | 455 |
| 397 | 5 th | 467 |
| 411 | 10 th | 485 |
| 422 | 15 th | 498 |
| 428 | 20 th | 508 |
| 438 | 25 th | 517 |
| 449 | 30 th | 524 |
| 453 | 35 th | 532 |
| 457 | 40 th | 538 |
| 461 | 45 th | 545 |
| 467 | 50 th | 552 |
| 471 | 55 th | 557 |
| 476 | 60 th | 562 |
| 482 | 65 th | 568 |
| 486 | 70 th | 575 |
| 494 | 75 th | 583 |
| 499 | 80 th | 591 |
| 510 | 85 th | 602 |
| 524 | 90 th | 614 |
| 544 | 95 th | 631 |
| 552 | 97 th | 642 |
| 554 | 98 th | 646 |
| 566 | 99 th | 661 |

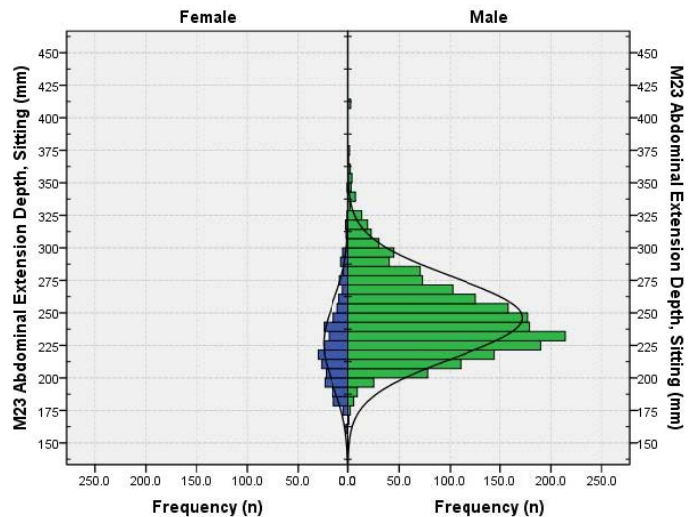


4.4.23 Abdominal Extension Depth, Sitting (M23)

Posture: Anthropometric Sitting with the right hand on the chest.

Definition: The horizontal distance between the Abdominal Point, Anterior, and point on the back at the same level.

| FEMALES | | MALES |
|-------------|--------------------------|-------|
| 277 | n | 1861 |
| 226 | Mean | 246 |
| 1.9 | SE (mean) | 0.7 |
| 31.8 | SD | 30.8 |
| 164 | Minimum | 168 |
| 345 | Maximum | 413 |
| 0.770 | Skewness | 0.969 |
| 0.448 | Kurtosis | 1.782 |
| 14.1% | Coefficient of variation | 12.5% |
| Percentiles | | |
| 174 | 1 st | 193 |
| 177 | 2 nd | 198 |
| 180 | 3 rd | 201 |
| 183 | 5 th | 205 |
| 189 | 10 th | 212 |
| 196 | 15 th | 217 |
| 198 | 20 th | 221 |
| 202 | 25 th | 225 |
| 208 | 30 th | 228 |
| 211 | 35 th | 232 |
| 215 | 40 th | 235 |
| 219 | 45 th | 238 |
| 221 | 50 th | 241 |
| 224 | 55 th | 245 |
| 230 | 60 th | 249 |
| 234 | 65 th | 253 |
| 238 | 70 th | 258 |
| 243 | 75 th | 263 |
| 250 | 80 th | 269 |
| 259 | 85 th | 277 |
| 273 | 90 th | 289 |
| 289 | 95 th | 304 |
| 296 | 97 th | 315 |
| 308 | 98 th | 323 |
| 318 | 99 th | 338 |

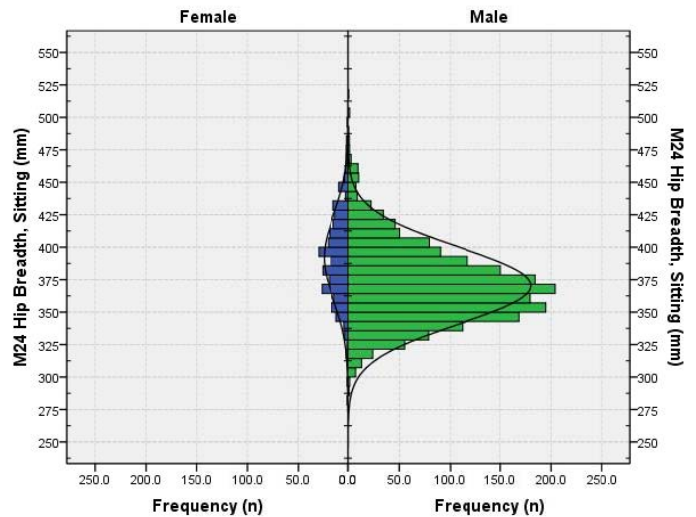


4.4.24 Hip Breadth, Sitting (M24)

Posture: Anthropometric Sitting, with knees together.

Definition: The maximum breadth of the seated subject at the hip or thigh, whichever is larger.

| FEMALES | | MALES |
|-------------|--------------------------|-------|
| 277 | n | 1861 |
| 392 | Mean | 370 |
| 1.9 | SE (mean) | 0.7 |
| 32.3 | SD | 29.4 |
| 284 | Minimum | 286 |
| 495 | Maximum | 520 |
| 0.224 | Skewness | 0.684 |
| 0.185 | Kurtosis | 1.028 |
| 8.2% | Coefficient of variation | 7.9% |
| Percentiles | | |
| 320 | 1 st | 312 |
| 333 | 2 nd | 319 |
| 339 | 3 rd | 323 |
| 344 | 5 th | 327 |
| 354 | 10 th | 336 |
| 358 | 15 th | 342 |
| 365 | 20 th | 346 |
| 369 | 25 th | 351 |
| 373 | 30 th | 354 |
| 378 | 35 th | 357 |
| 380 | 40 th | 361 |
| 385 | 45 th | 365 |
| 391 | 50 th | 368 |
| 396 | 55 th | 371 |
| 399 | 60 th | 375 |
| 403 | 65 th | 378 |
| 409 | 70 th | 382 |
| 414 | 75 th | 387 |
| 420 | 80 th | 393 |
| 425 | 85 th | 400 |
| 435 | 90 th | 409 |
| 446 | 95 th | 422 |
| 457 | 97 th | 433 |
| 466 | 98 th | 443 |
| 479 | 99 th | 458 |

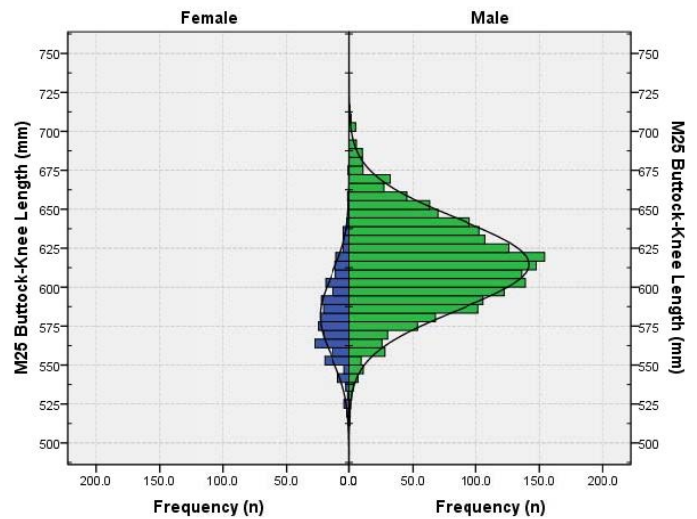
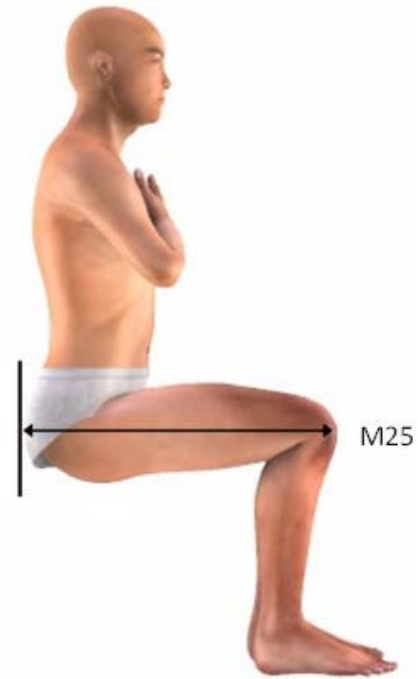


4.4.25 Buttock-Knee Length (M25)

Posture: Anthropometric Sitting.

Definition: The horizontal distance between Buttock Point, Posterior and the Knee Point, Anterior.

| FEMALES | | MALES |
|-------------|--------------------------|-------|
| 277 | n | 1861 |
| 582 | Mean | 615 |
| 1.6 | SE (mean) | 0.7 |
| 26.1 | SD | 29.1 |
| 512 | Minimum | 512 |
| 675 | Maximum | 713 |
| 0.242 | Skewness | 0.065 |
| 0.126 | Kurtosis | 0.128 |
| 4.5% | Coefficient of variation | 4.7% |
| Percentiles | | |
| 521 | 1 st | 546 |
| 527 | 2 nd | 556 |
| 535 | 3 rd | 559 |
| 540 | 5 th | 567 |
| 550 | 10 th | 579 |
| 555 | 15 th | 586 |
| 561 | 20 th | 590 |
| 564 | 25 th | 595 |
| 567 | 30 th | 599 |
| 570 | 35 th | 603 |
| 575 | 40 th | 607 |
| 577 | 45 th | 611 |
| 579 | 50 th | 614 |
| 584 | 55 th | 618 |
| 586 | 60 th | 621 |
| 591 | 65 th | 625 |
| 593 | 70 th | 629 |
| 599 | 75 th | 634 |
| 604 | 80 th | 639 |
| 610 | 85 th | 645 |
| 617 | 90 th | 652 |
| 627 | 95 th | 664 |
| 634 | 97 th | 670 |
| 637 | 98 th | 677 |
| 650 | 99 th | 685 |

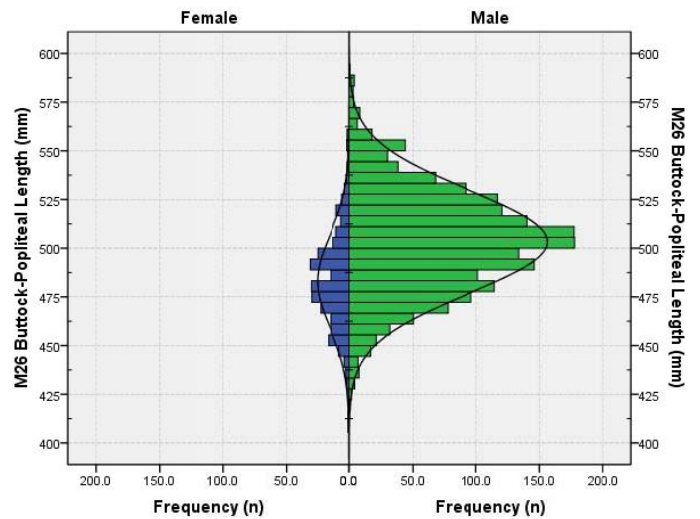
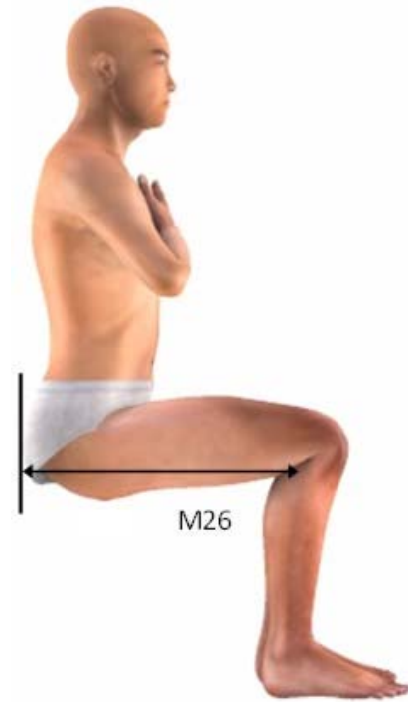


4.4.26 Buttock-Popliteal Length (M26)

Posture: Anthropometric Sitting.

Definition: The horizontal distance between Buttock Point, Posterior and the Dorsal Juncture of Calf and Thigh.

| FEMALES | | MALES |
|-------------|--------------------------|-------|
| 277 | n | 1860 |
| 483 | Mean | 503 |
| 1.4 | SE (mean) | 0.6 |
| 24.0 | SD | 26.4 |
| 407 | Minimum | 420 |
| 559 | Maximum | 589 |
| 0.283 | Skewness | 0.061 |
| 0.431 | Kurtosis | 0.084 |
| 5.0% | Coefficient of variation | 5.2% |
| Percentiles | | |
| 429 | 1 st | 441 |
| 435 | 2 nd | 449 |
| 442 | 3 rd | 455 |
| 447 | 5 th | 462 |
| 452 | 10 th | 470 |
| 458 | 15 th | 476 |
| 464 | 20 th | 481 |
| 467 | 25 th | 485 |
| 470 | 30 th | 490 |
| 474 | 35 th | 493 |
| 477 | 40 th | 497 |
| 479 | 45 th | 500 |
| 481 | 50 th | 504 |
| 485 | 55 th | 507 |
| 489 | 60 th | 510 |
| 490 | 65 th | 513 |
| 494 | 70 th | 517 |
| 497 | 75 th | 521 |
| 500 | 80 th | 525 |
| 507 | 85 th | 530 |
| 516 | 90 th | 536 |
| 526 | 95 th | 549 |
| 533 | 97 th | 554 |
| 541 | 98 th | 557 |
| 551 | 99 th | 569 |



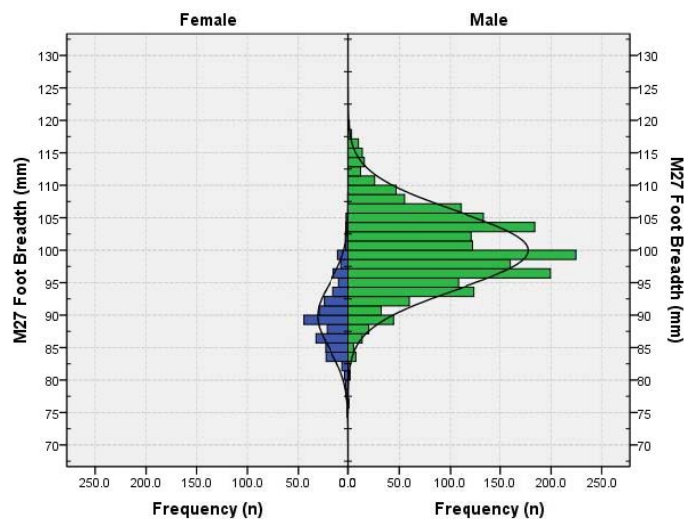
4.4.27 Foot Breadth, Horizontal (M27)

Posture: Anthropometric Standing.

Definition: The maximum horizontal distance between the First Metatarsophalangeal Protrusion and the Fifth Metatarsophalangeal Protrusion.



| FEMALES | | MALES |
|-------------|--------------------------|-------|
| 277 | n | 1861 |
| 90 | Mean | 100 |
| 0.3 | SE (mean) | 0.1 |
| 5.1 | SD | 6.0 |
| 75 | Minimum | 76 |
| 104 | Maximum | 120 |
| 0.431 | Skewness | 0.067 |
| 0.204 | Kurtosis | 0.294 |
| 5.7% | Coefficient of variation | 6.0% |
| Percentiles | | |
| 78 | 1 st | 86 |
| 81 | 2 nd | 88 |
| 81 | 3 rd | 89 |
| 83 | 5 th | 90 |
| 84 | 10 th | 93 |
| 85 | 15 th | 94 |
| 85 | 20 th | 95 |
| 86 | 25 th | 96 |
| 87 | 30 th | 97 |
| 88 | 35 th | 98 |
| 89 | 40 th | 98 |
| 89 | 45 th | 99 |
| 90 | 50 th | 100 |
| 90 | 55 th | 101 |
| 91 | 60 th | 101 |
| 91 | 65 th | 102 |
| 92 | 70 th | 103 |
| 92 | 75 th | 104 |
| 94 | 80 th | 105 |
| 96 | 85 th | 106 |
| 97 | 90 th | 107 |
| 100 | 95 th | 110 |
| 101 | 97 th | 112 |
| 102 | 98 th | 113 |
| 104 | 99 th | 115 |

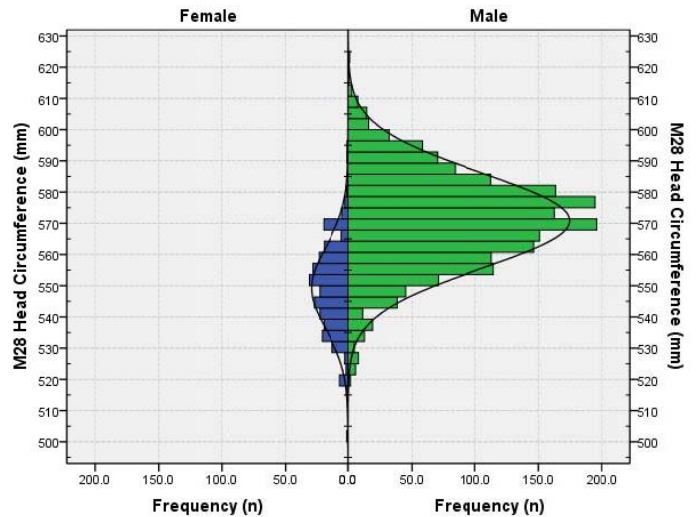
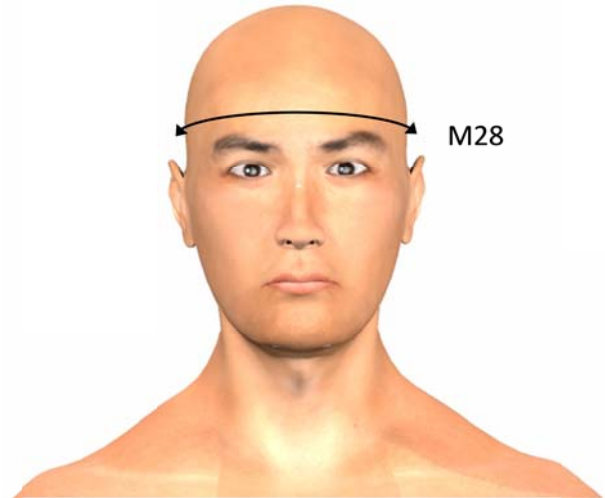


4.4.28 Head Circumference (M28)

Posture: Anthropometric Sitting with the head in the Frankfort place.

Definition: The maximum horizontal circumference of the head above the supraorbital ridges and ears, at the level of Glabella.

| FEMALES | | MALES |
|-------------|--------------------------|--------|
| 277 | n | 1860 |
| 549 | Mean | 571 |
| 0.8 | SE (mean) | 0.4 |
| 13.4 | SD | 15.2 |
| 503 | Minimum | 519 |
| 595 | Maximum | 624 |
| -0.046 | Skewness | -0.173 |
| 0.214 | Kurtosis | 0.307 |
| 2.4% | Coefficient of variation | 2.7% |
| Percentiles | | |
| 519 | 1 st | 531 |
| 520 | 2 nd | 537 |
| 521 | 3 rd | 540 |
| 530 | 5 th | 545 |
| 533 | 10 th | 552 |
| 535 | 15 th | 556 |
| 537 | 20 th | 559 |
| 540 | 25 th | 561 |
| 542 | 30 th | 563 |
| 544 | 35 th | 566 |
| 545 | 40 th | 568 |
| 548 | 45 th | 569 |
| 550 | 50 th | 571 |
| 551 | 55 th | 573 |
| 553 | 60 th | 575 |
| 555 | 65 th | 577 |
| 557 | 70 th | 579 |
| 558 | 75 th | 581 |
| 561 | 80 th | 583 |
| 563 | 85 th | 586 |
| 568 | 90 th | 590 |
| 570 | 95 th | 595 |
| 573 | 97 th | 598 |
| 574 | 98 th | 601 |
| 578 | 99 th | 606 |

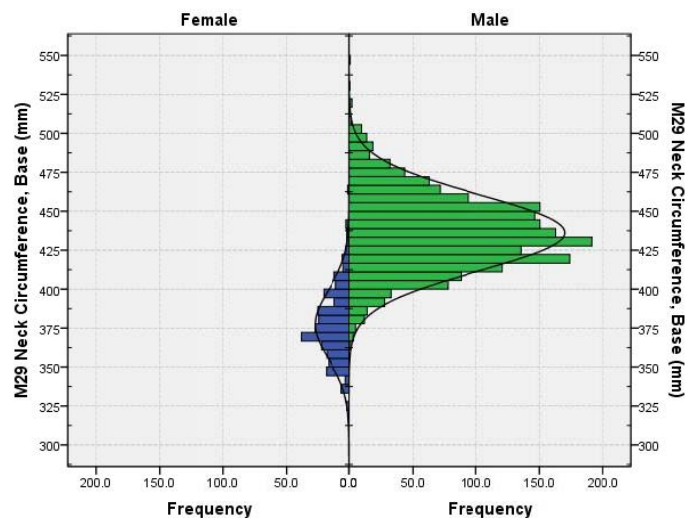
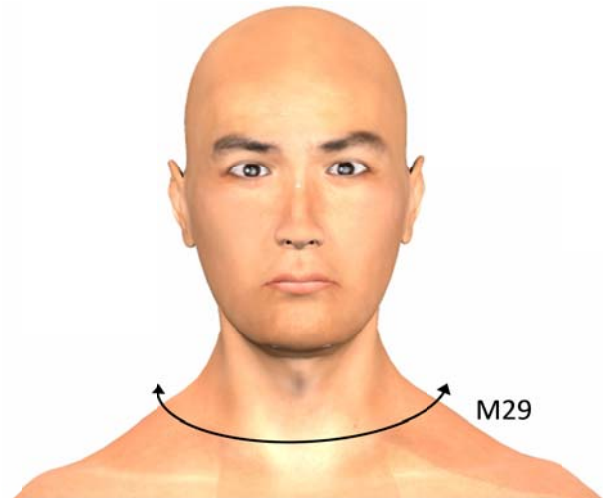


4.4.29 Neck Circumference, Base (M29)

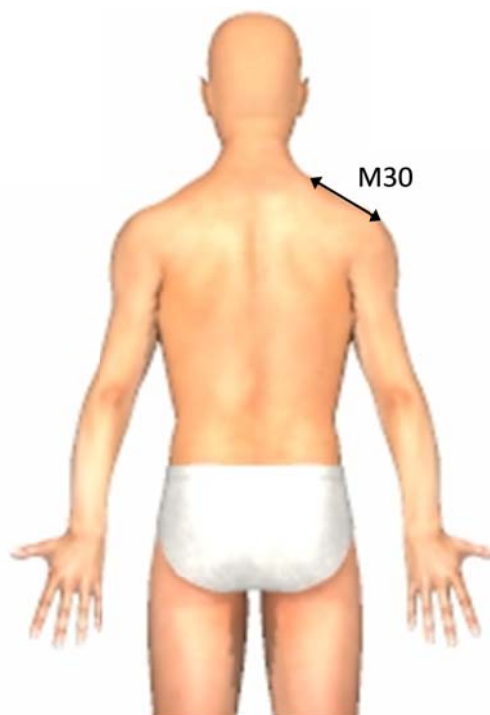
Posture: Anthropometric Standing with the head in the Frankfort plane.

Definition: The circumference at the base of the neck.

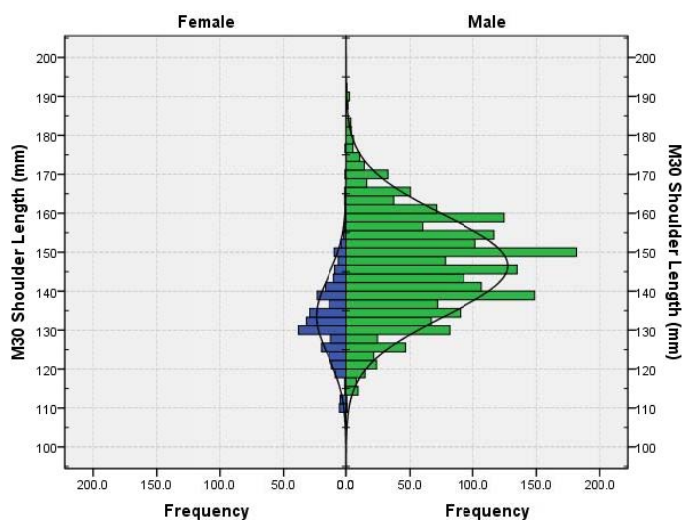
| FEMALES | | MALES |
|-------------|--------------------------|-------|
| 277 | n | 1861 |
| 377 | Mean | 436 |
| 1.3 | SE (mean) | 0.6 |
| 22.3 | SD | 24.3 |
| 323 | Minimum | 362 |
| 462 | Maximum | 546 |
| 0.600 | Skewness | 0.285 |
| 0.651 | Kurtosis | 0.322 |
| 5.9% | Coefficient of variation | 5.6% |
| Percentiles | | |
| 334 | 1 st | 382 |
| 338 | 2 nd | 389 |
| 340 | 3 rd | 393 |
| 346 | 5 th | 399 |
| 350 | 10 th | 407 |
| 355 | 15 th | 412 |
| 359 | 20 th | 416 |
| 362 | 25 th | 420 |
| 366 | 30 th | 423 |
| 368 | 35 th | 426 |
| 370 | 40 th | 430 |
| 372 | 45 th | 432 |
| 375 | 50 th | 434 |
| 377 | 55 th | 438 |
| 381 | 60 th | 442 |
| 384 | 65 th | 445 |
| 386 | 70 th | 448 |
| 391 | 75 th | 451 |
| 396 | 80 th | 455 |
| 400 | 85 th | 461 |
| 408 | 90 th | 468 |
| 420 | 95 th | 478 |
| 425 | 97 th | 485 |
| 435 | 98 th | 492 |
| 441 | 99 th | 497 |



4.4.30 Shoulder Length (M30)

Posture: Anthropometric Standing**Definition:** The surface distance between the Trapezium Point (Right) and the Acromion (Right).

| FEMALES | | MALES |
|-------------|--------------------------|-------|
| 277 | n | 1860 |
| 134 | Mean | 147 |
| 0.6 | SE (mean) | 0.3 |
| 10.2 | SD | 12.9 |
| 108 | Minimum | 110 |
| 176 | Maximum | 192 |
| 0.395 | Skewness | .078 |
| 1.253 | Kurtosis | -.061 |
| 7.6% | Coefficient of variation | 8.8% |
| Percentiles | | |
| 110 | 1 st | 117 |
| 110 | 2 nd | 121 |
| 113 | 3 rd | 122 |
| 118 | 5 th | 125 |
| 122 | 10 th | 130 |
| 124 | 15 th | 133 |
| 126 | 20 th | 135 |
| 128 | 25 th | 138 |
| 129 | 30 th | 140 |
| 130 | 35 th | 142 |
| 131 | 40 th | 143 |
| 132 | 45 th | 145 |
| 133 | 50 th | 146 |
| 134 | 55 th | 149 |
| 135 | 60 th | 150 |
| 136 | 65 th | 152 |
| 138 | 70 th | 153 |
| 140 | 75 th | 155 |
| 141 | 80 th | 158 |
| 143 | 85 th | 160 |
| 146 | 90 th | 162 |
| 151 | 95 th | 167 |
| 154 | 97 th | 170 |
| 157 | 98 th | 173 |
| 165 | 99 th | 178 |

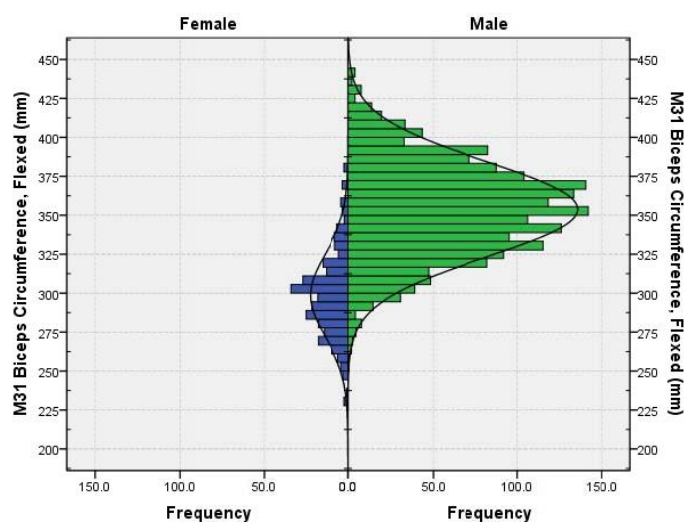
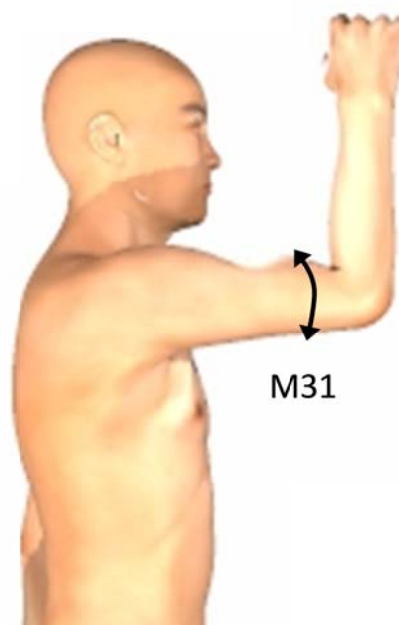


4.4.31 Biceps Circumference, Flexed (M31)

Posture: Anthropometric Standing with the right shoulder and elbow flexed at 90°.

Definition: The circumference of the upper arm at the height of the Biceps Point.

| FEMALES | | MALES |
|-------------|--------------------------|--------|
| 277 | n | 1861 |
| 299 | Mean | 354 |
| 1.6 | SE (mean) | 0.7 |
| 26.9 | SD | 30.4 |
| 230 | Minimum | 253 |
| 382 | Maximum | 442 |
| 0.449 | Skewness | -0.023 |
| 0.465 | Kurtosis | -0.190 |
| 9.0% | Coefficient of variation | 8.6% |
| Percentiles | | |
| 234 | 1 st | 282 |
| 249 | 2 nd | 294 |
| 254 | 3 rd | 297 |
| 257 | 5 th | 303 |
| 267 | 10 th | 315 |
| 271 | 15 th | 322 |
| 276 | 20 th | 327 |
| 280 | 25 th | 332 |
| 285 | 30 th | 337 |
| 286 | 35 th | 342 |
| 290 | 40 th | 346 |
| 294 | 45 th | 350 |
| 299 | 50 th | 355 |
| 302 | 55 th | 359 |
| 304 | 60 th | 363 |
| 306 | 65 th | 366 |
| 309 | 70 th | 370 |
| 312 | 75 th | 374 |
| 319 | 80 th | 380 |
| 323 | 85 th | 386 |
| 335 | 90 th | 392 |
| 349 | 95 th | 405 |
| 356 | 97 th | 410 |
| 369 | 98 th | 414 |
| 377 | 99 th | 423 |

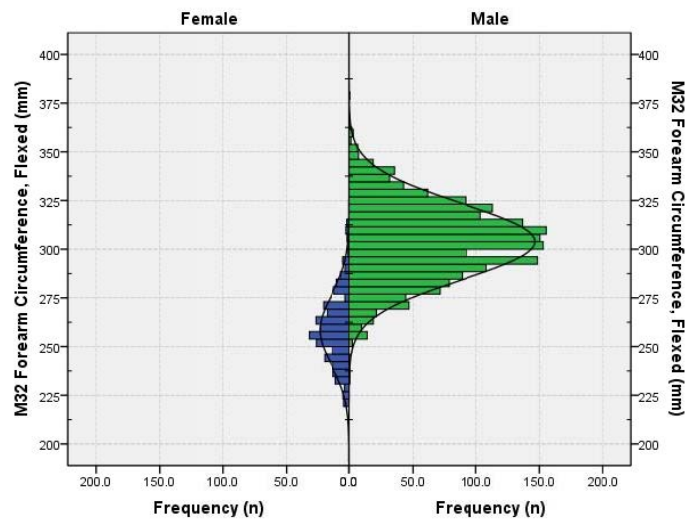


4.4.32 Forearm Circumference, Flexed (M32)

Posture: Anthropometric Standing with the right shoulder and elbow flexed at 90°.

Definition: The circumference of the forearm at the Elbow Crease.

| FEMALES | | MALES |
|-------------|--------------------------|--------|
| 277 | n | 1861 |
| 259 | Mean | 304 |
| 1.1 | SE (mean) | 0.5 |
| 18.0 | SD | 19.5 |
| 219 | Minimum | 231 |
| 315 | Maximum | 377 |
| 0.445 | Skewness | -0.059 |
| 0.448 | Kurtosis | -0.112 |
| 6.9% | Coefficient of variation | 6.4% |
| Percentiles | | |
| 220 | 1 st | 257 |
| 224 | 2 nd | 264 |
| 225 | 3 rd | 268 |
| 232 | 5 th | 272 |
| 235 | 10 th | 278 |
| 240 | 15 th | 283 |
| 244 | 20 th | 287 |
| 246 | 25 th | 291 |
| 250 | 30 th | 294 |
| 252 | 35 th | 296 |
| 254 | 40 th | 300 |
| 256 | 45 th | 302 |
| 257 | 50 th | 305 |
| 260 | 55 th | 307 |
| 262 | 60 th | 310 |
| 264 | 65 th | 312 |
| 266 | 70 th | 315 |
| 269 | 75 th | 317 |
| 272 | 80 th | 321 |
| 277 | 85 th | 324 |
| 282 | 90 th | 329 |
| 291 | 95 th | 336 |
| 296 | 97 th | 341 |
| 306 | 98 th | 343 |
| 311 | 99 th | 348 |

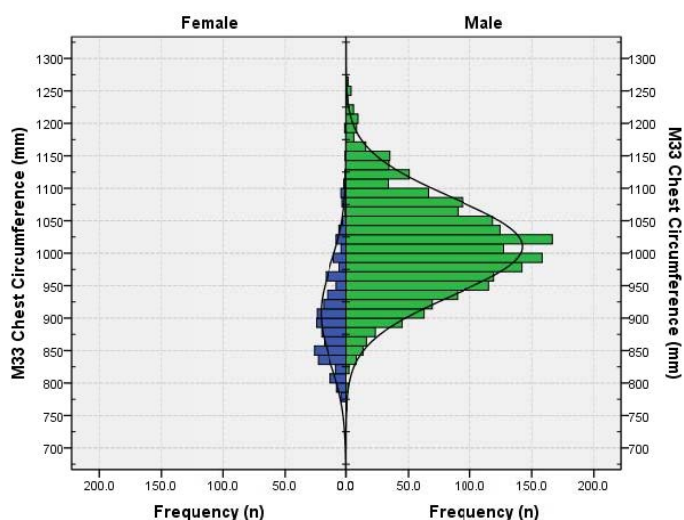


4.4.33 Chest Circumference (M33)

Posture: Anthropometric Standing.

Definition: The circumference of the chest at the height of the Bustpoint, Right (females) or Thelion, Right (males).

| FEMALES | | MALES |
|-------------|--------------------------|-------|
| 277 | n | 1860 |
| 907 | Mean | 1010 |
| 4.5 | SE (mean) | 1.7 |
| 75.1 | SD | 74.3 |
| 775 | Minimum | 761 |
| 1189 | Maximum | 1270 |
| 0.829 | Skewness | 0.274 |
| 0.680 | Kurtosis | 0.167 |
| 8.3% | Coefficient of variation | 7.4% |
| Percentiles | | |
| 783 | 1 st | 850 |
| 789 | 2 nd | 869 |
| 791 | 3 rd | 878 |
| 803 | 5 th | 893 |
| 819 | 10 th | 918 |
| 834 | 15 th | 933 |
| 842 | 20 th | 947 |
| 847 | 25 th | 961 |
| 859 | 30 th | 970 |
| 870 | 35 th | 979 |
| 878 | 40 th | 989 |
| 890 | 45 th | 998 |
| 899 | 50 th | 1009 |
| 907 | 55 th | 1017 |
| 913 | 60 th | 1025 |
| 926 | 65 th | 1035 |
| 932 | 70 th | 1045 |
| 945 | 75 th | 1056 |
| 966 | 80 th | 1070 |
| 990 | 85 th | 1085 |
| 1016 | 90 th | 1110 |
| 1048 | 95 th | 1141 |
| 1088 | 97 th | 1156 |
| 1098 | 98 th | 1173 |
| 1121 | 99 th | 1206 |

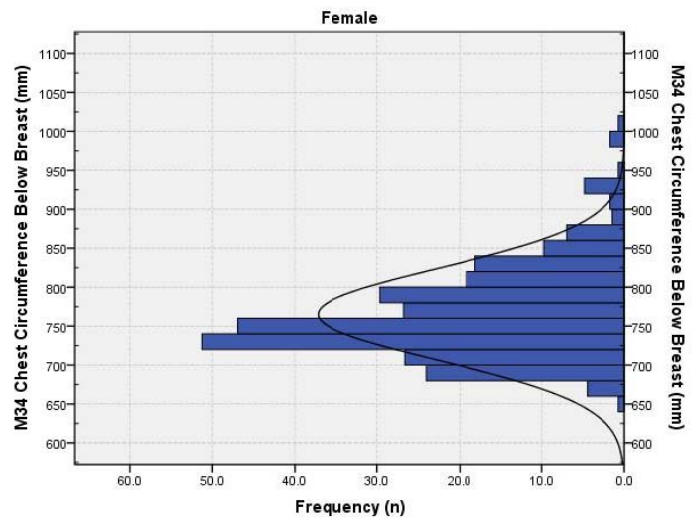
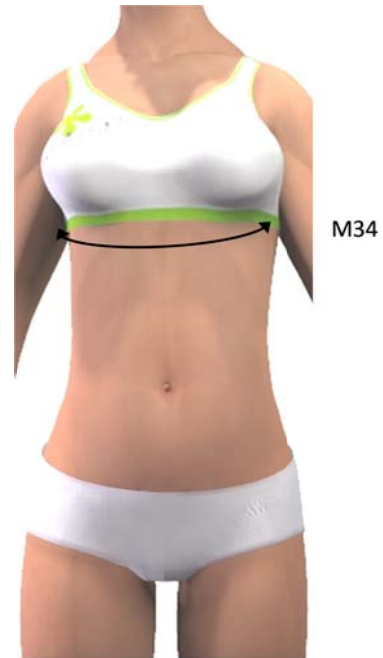


4.4.34 Chest Circumference Below Breast (M34)

Posture: Anthropometric Standing.

Definition: The circumference of the chest at the height of the Inferior Breastpoint (females only).

| FEMALES | | MALES |
|---------|--------------------------|--------------|
| 276 | n | |
| 765 | Mean | |
| 3.6 | SE (mean) | |
| 59.2 | SD | |
| 659 | Minimum | |
| 1011 | Maximum | |
| 1.102 | Skewness | |
| 1.722 | Kurtosis | |
| 7.7% | Coefficient of variation | |
| | Percentiles | |
| 673 | 1 st | |
| 679 | 2 nd | |
| 682 | 3 rd | |
| 686 | 5 th | |
| 697 | 10 th | |
| 711 | 15 th | |
| 719 | 20 th | |
| 723 | 25 th | |
| 730 | 30 th | |
| 733 | 35 th | |
| 742 | 40 th | |
| 749 | 45 th | |
| 754 | 50 th | |
| 758 | 55 th | |
| 769 | 60 th | |
| 779 | 65 th | |
| 785 | 70 th | |
| 796 | 75 th | |
| 810 | 80 th | |
| 827 | 85 th | |
| 843 | 90 th | |
| 874 | 95 th | |
| 916 | 97 th | |
| 928 | 98 th | |
| 979 | 99 th | |
| | | Not measured |

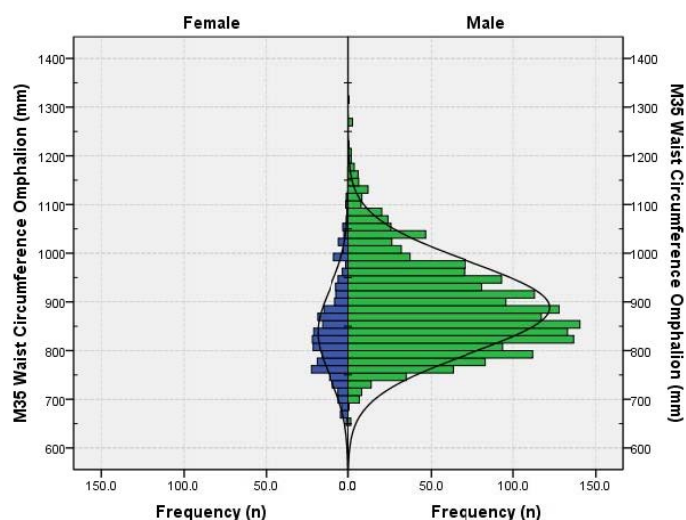
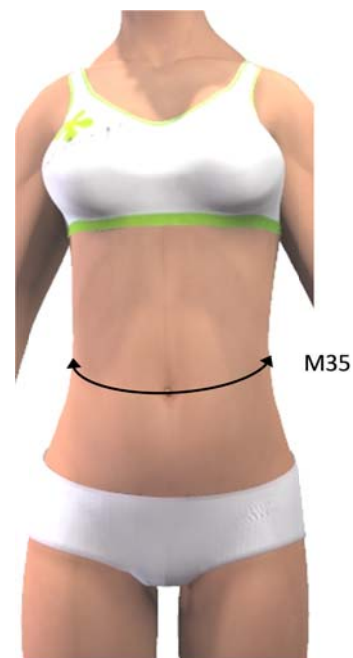


4.4.35 Waist Circumference (Omphalion) (M35)

Posture: Anthropometric Standing.

Definition: The horizontal circumference of the torso at the height of the Waist (Omphalion) Anterior.

| FEMALES | | MALES |
|-------------|--------------------------|-------|
| 277 | n | 1861 |
| 837 | Mean | 888 |
| 5.4 | SE (mean) | 2.2 |
| 90.4 | SD | 93.5 |
| 652 | Minimum | 656 |
| 1122 | Maximum | 1320 |
| 0.657 | Skewness | 0.749 |
| 0.277 | Kurtosis | 0.596 |
| 10.8% | Coefficient of variation | 10.5% |
| Percentiles | | |
| 666 | 1 st | 726 |
| 676 | 2 nd | 742 |
| 689 | 3 rd | 752 |
| 702 | 5 th | 759 |
| 735 | 10 th | 782 |
| 753 | 15 th | 794 |
| 760 | 20 th | 808 |
| 775 | 25 th | 820 |
| 784 | 30 th | 831 |
| 795 | 35 th | 842 |
| 808 | 40 th | 852 |
| 818 | 45 th | 863 |
| 827 | 50 th | 875 |
| 835 | 55 th | 887 |
| 846 | 60 th | 900 |
| 859 | 65 th | 913 |
| 870 | 70 th | 927 |
| 883 | 75 th | 943 |
| 902 | 80 th | 963 |
| 935 | 85 th | 981 |
| 976 | 90 th | 1022 |
| 1022 | 95 th | 1064 |
| 1040 | 97 th | 1092 |
| 1057 | 98 th | 1122 |
| 1092 | 99 th | 1153 |



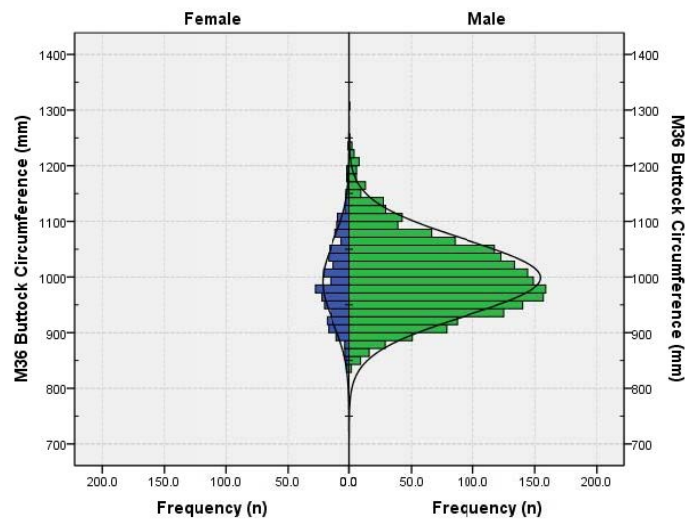
4.4.36 Buttock Circumference (M36)

Posture: Anthropometric Standing.

Definition: The horizontal circumference of the torso at height of the Buttock Point, Posterior.



| FEMALES | | MALES |
|-------------|--------------------------|-------|
| 277 | n | 1861 |
| 991 | Mean | 999 |
| 4.3 | SE (mean) | 1.6 |
| 71.7 | SD | 68.6 |
| 830 | Minimum | 785 |
| 1239 | Maximum | 1309 |
| 0.435 | Skewness | 0.491 |
| 0.027 | Kurtosis | 0.361 |
| 7.2% | Coefficient of variation | 6.9% |
| Percentiles | | |
| 844 | 1 st | 862 |
| 859 | 2 nd | 876 |
| 872 | 3 rd | 885 |
| 888 | 5 th | 898 |
| 904 | 10 th | 914 |
| 915 | 15 th | 930 |
| 927 | 20 th | 940 |
| 941 | 25 th | 950 |
| 949 | 30 th | 959 |
| 958 | 35 th | 968 |
| 969 | 40 th | 975 |
| 974 | 45 th | 984 |
| 983 | 50 th | 992 |
| 991 | 55 th | 1003 |
| 1002 | 60 th | 1012 |
| 1013 | 65 th | 1022 |
| 1027 | 70 th | 1031 |
| 1041 | 75 th | 1042 |
| 1051 | 80 th | 1053 |
| 1072 | 85 th | 1067 |
| 1093 | 90 th | 1086 |
| 1113 | 95 th | 1124 |
| 1133 | 97 th | 1140 |
| 1158 | 98 th | 1164 |
| 1189 | 99 th | 1190 |



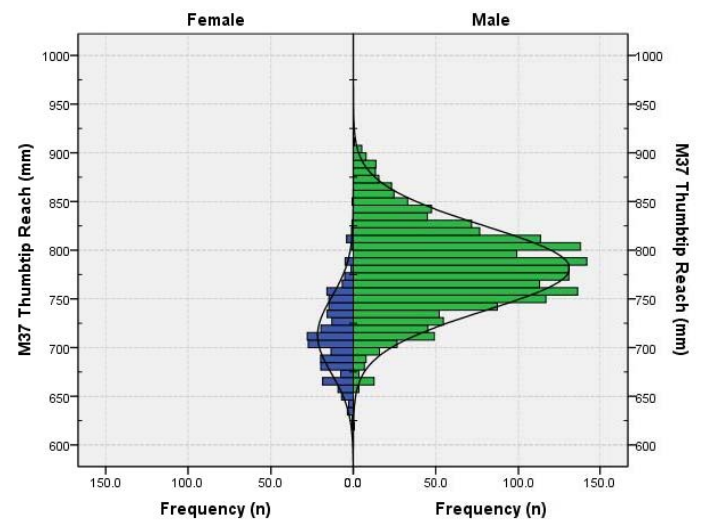
4.4.37 Thumbtip Reach (M37)

Posture: Anthropometric Standing.

Definition: The horizontal distance between the wall and the Thumbtip.



| FEMALES | | MALES |
|-------------|--------------------------|-------|
| 276 | n | 1861 |
| 713 | Mean | 781 |
| 2.4 | SE (mean) | 1.0 |
| 39.4 | SD | 43.6 |
| 623 | Minimum | 623 |
| 850 | Maximum | 912 |
| 0.365 | Skewness | 0.079 |
| 0.058 | Kurtosis | 0.083 |
| 5.5% | Coefficient of variation | 5.6% |
| Percentiles | | |
| 634 | 1 st | 673 |
| 639 | 2 nd | 695 |
| 645 | 3 rd | 701 |
| 651 | 5 th | 710 |
| 664 | 10 th | 726 |
| 669 | 15 th | 739 |
| 678 | 20 th | 747 |
| 684 | 25 th | 753 |
| 690 | 30 th | 759 |
| 697 | 35 th | 764 |
| 702 | 40 th | 770 |
| 705 | 45 th | 775 |
| 710 | 50 th | 780 |
| 713 | 55 th | 785 |
| 720 | 60 th | 791 |
| 727 | 65 th | 798 |
| 733 | 70 th | 803 |
| 741 | 75 th | 810 |
| 747 | 80 th | 816 |
| 755 | 85 th | 825 |
| 760 | 90 th | 838 |
| 779 | 95 th | 855 |
| 795 | 97 th | 870 |
| 808 | 98 th | 878 |
| 820 | 99 th | 890 |



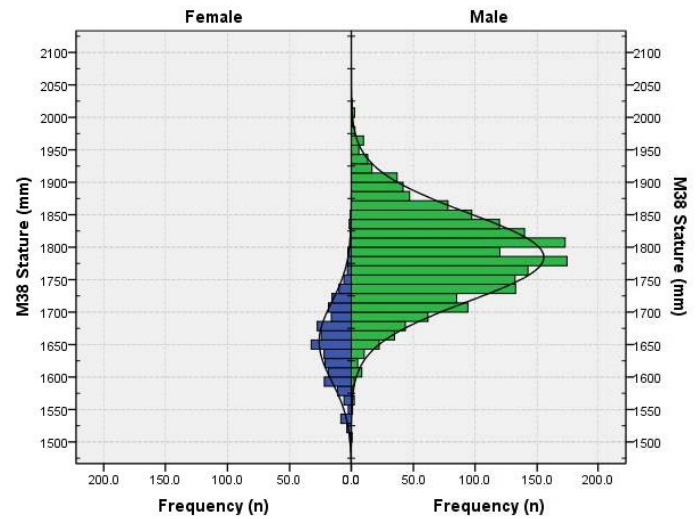
4.4.38 Stature (M38)

Posture: Anthropometric Standing with the head in the Frankfort plane.

Definition: The vertical distance between the standing surface and the Top of the Head landmark.



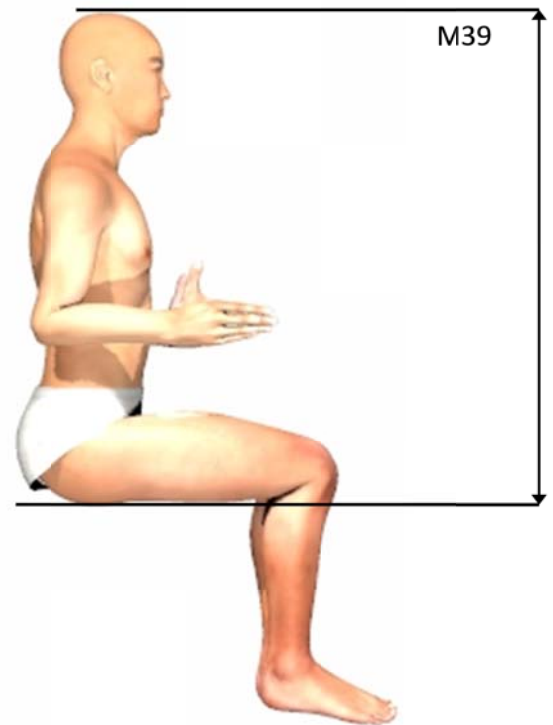
| FEMALES | | MALES |
|-------------|--------------------------|-------|
| 277 | n | 1861 |
| 1654 | Mean | 1785 |
| 3.7 | SE (mean) | 1.6 |
| 61.1 | SD | 68.3 |
| 1512 | Minimum | 1511 |
| 1852 | Maximum | 2025 |
| 0.188 | Skewness | 0.010 |
| 0.172 | Kurtosis | 0.171 |
| 3.7% | Coefficient of variation | 3.8% |
| Percentiles | | |
| 1518 | 1 st | 1623 |
| 1531 | 2 nd | 1645 |
| 1536 | 3 rd | 1660 |
| 1549 | 5 th | 1672 |
| 1581 | 10 th | 1698 |
| 1592 | 15 th | 1713 |
| 1600 | 20 th | 1729 |
| 1614 | 25 th | 1738 |
| 1620 | 30 th | 1747 |
| 1631 | 35 th | 1759 |
| 1641 | 40 th | 1767 |
| 1649 | 45 th | 1777 |
| 1654 | 50 th | 1784 |
| 1661 | 55 th | 1794 |
| 1666 | 60 th | 1803 |
| 1677 | 65 th | 1812 |
| 1684 | 70 th | 1820 |
| 1693 | 75 th | 1830 |
| 1704 | 80 th | 1840 |
| 1719 | 85 th | 1853 |
| 1732 | 90 th | 1869 |
| 1755 | 95 th | 1899 |
| 1776 | 97 th | 1913 |
| 1798 | 98 th | 1929 |
| 1826 | 99 th | 1953 |



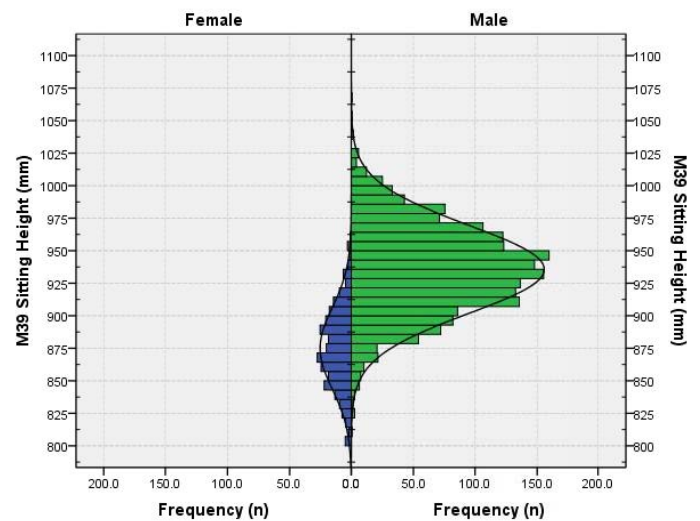
4.4.39 Sitting Height (M39)

Posture: Anthropometric Sitting, with the arms hanging relaxed and the head in the Frankfort plane.

Definition: The vertical distance between the sitting surface and Top of the Head.



| FEMALES | | MALES |
|-------------|--------------------------|--------|
| 277 | n | 1861 |
| 875 | Mean | 936 |
| 1.9 | SE (mean) | 0.8 |
| 31.5 | SD | 34.1 |
| 801 | Minimum | 808 |
| 962 | Maximum | 1069 |
| 0.118 | Skewness | -0.045 |
| -0.248 | Kurtosis | 0.002 |
| 3.6% | Coefficient of variation | 3.6% |
| Percentiles | | |
| 804 | 1 st | 854 |
| 810 | 2 nd | 866 |
| 818 | 3 rd | 874 |
| 824 | 5 th | 881 |
| 835 | 10 th | 892 |
| 843 | 15 th | 899 |
| 847 | 20 th | 908 |
| 852 | 25 th | 912 |
| 858 | 30 th | 918 |
| 862 | 35 th | 922 |
| 865 | 40 th | 927 |
| 869 | 45 th | 931 |
| 873 | 50 th | 936 |
| 879 | 55 th | 940 |
| 884 | 60 th | 944 |
| 890 | 65 th | 949 |
| 892 | 70 th | 954 |
| 896 | 75 th | 960 |
| 901 | 80 th | 965 |
| 907 | 85 th | 971 |
| 915 | 90 th | 980 |
| 929 | 95 th | 991 |
| 936 | 97 th | 998 |
| 945 | 98 th | 1005 |
| 954 | 99 th | 1012 |

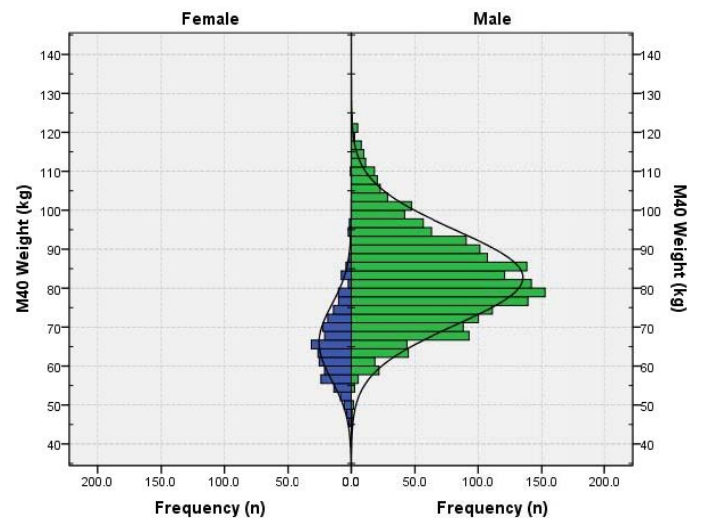


4.4.40 Weight (M40)

Posture: Anthropometric Standing.

Definition: The mass of the subject recorded to the nearest 0.1kg.

| FEMALES | | MALES |
|-------------|--------------------------|-------|
| 277 | n | 1861 |
| 66.0 | Mean | 82.7 |
| 0.6 | SE (mean) | 0.3 |
| 9.7 | SD | 12.2 |
| 45.4 | Minimum | 46.7 |
| 109.0 | Maximum | 123.5 |
| 0.705 | Skewness | 0.424 |
| 0.972 | Kurtosis | 0.071 |
| 14.7% | Coefficient of variation | 14.7% |
| Percentiles | | |
| 47.2 | 1 st | 58.9 |
| 49.2 | 2 nd | 60.3 |
| 51.0 | 3 rd | 62.5 |
| 51.7 | 5 th | 64.2 |
| 54.2 | 10 th | 67.7 |
| 56.7 | 15 th | 70.0 |
| 57.6 | 20 th | 72.3 |
| 59.1 | 25 th | 74.1 |
| 60.3 | 30 th | 76.0 |
| 61.5 | 35 th | 77.6 |
| 62.9 | 40 th | 78.7 |
| 63.9 | 45 th | 80.2 |
| 65.0 | 50 th | 81.7 |
| 66.0 | 55 th | 83.3 |
| 67.4 | 60 th | 84.9 |
| 68.8 | 65 th | 86.5 |
| 70.1 | 70 th | 88.3 |
| 72.2 | 75 th | 90.2 |
| 73.3 | 80 th | 92.5 |
| 75.6 | 85 th | 95.1 |
| 78.9 | 90 th | 99.4 |
| 83.6 | 95 th | 104.9 |
| 86.4 | 97 th | 108.9 |
| 91.8 | 98 th | 111.4 |
| 94.7 | 99 th | 115.1 |

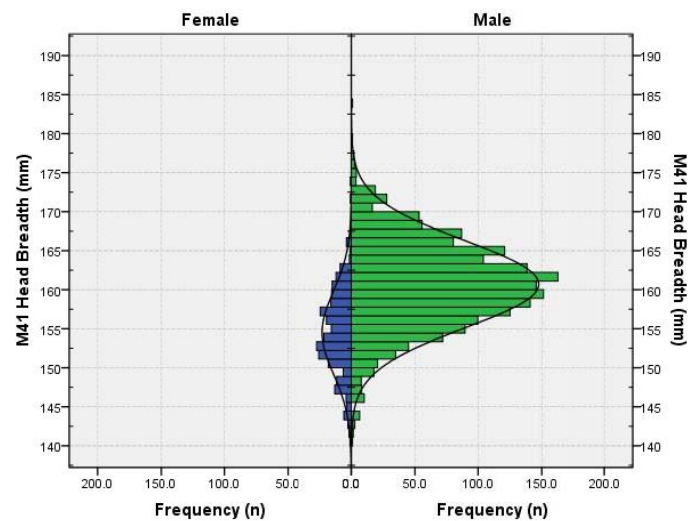
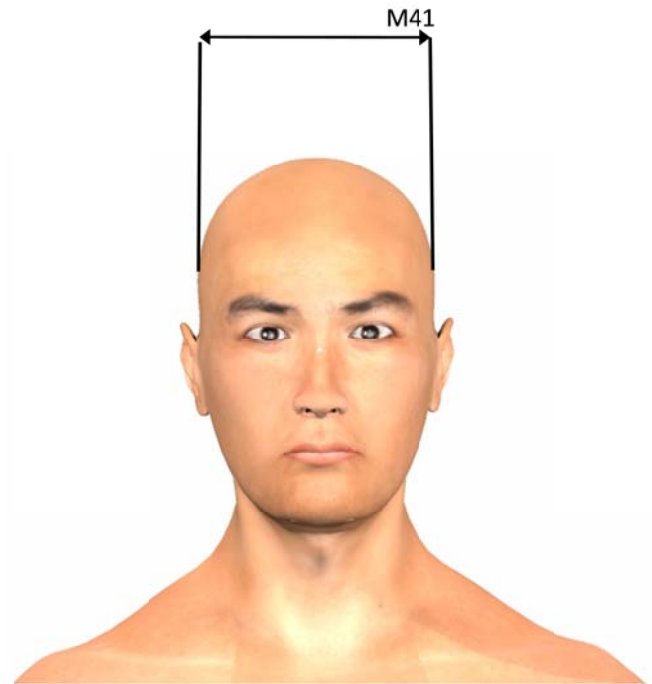


4.4.41 Head Breadth (M41)

Posture: Anthropometric Standing.

Definition: The point-to-point distance between the digitally-extracted Head Breadth Marker Left and Head Breadth Marker Right landmarks.

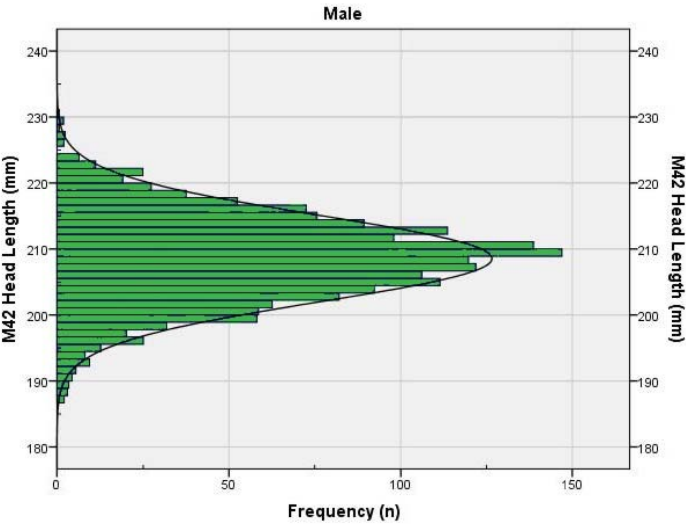
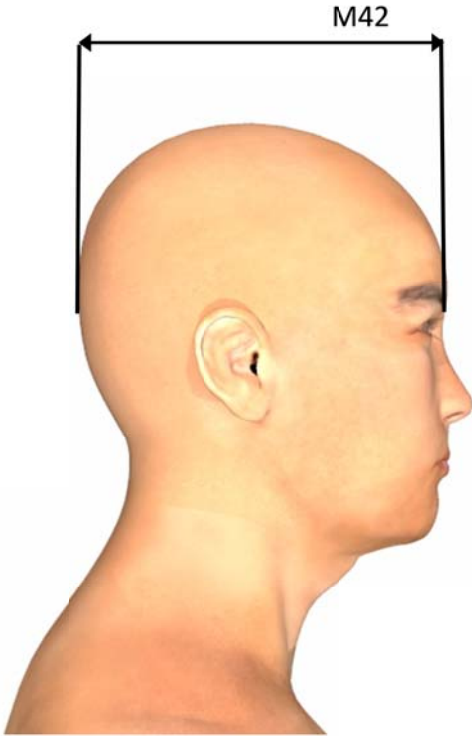
| FEMALES | | MALES |
|-------------|--------------------------|--------|
| 276 | n | 1861 |
| 155 | Mean | 161 |
| 0.3 | SE (mean) | 0.1 |
| 5.4 | SD | 5.6 |
| 141 | Minimum | 140 |
| 173 | Maximum | 184 |
| 0.022 | Skewness | -0.097 |
| 0.114 | Kurtosis | 0.336 |
| 3.5% | Coefficient of variation | 3.5% |
| Percentiles | | |
| 142 | 1 st | 146 |
| 143 | 2 nd | 149 |
| 144 | 3 rd | 150 |
| 145 | 5 th | 152 |
| 147 | 10 th | 154 |
| 148 | 15 th | 155 |
| 150 | 20 th | 156 |
| 151 | 25 th | 157 |
| 152 | 30 th | 158 |
| 153 | 35 th | 159 |
| 153 | 40 th | 159 |
| 154 | 45 th | 160 |
| 154 | 50 th | 161 |
| 155 | 55 th | 161 |
| 156 | 60 th | 162 |
| 157 | 65 th | 163 |
| 158 | 70 th | 164 |
| 158 | 75 th | 165 |
| 159 | 80 th | 165 |
| 160 | 85 th | 167 |
| 161 | 90 th | 168 |
| 163 | 95 th | 170 |
| 164 | 97 th | 171 |
| 166 | 98 th | 172 |
| 167 | 99 th | 173 |



4.4.42 Head Length (M42)

Posture: Anthropometric Standing.
Definition: The point-to-point distance between the digitally-extracted Glabella and Opisthocranion.

| FEMALES | | MALES |
|--------------|--------------------------|--------|
| Not measured | n | 1860 |
| | Mean | 209 |
| | SE (mean) | 0.2 |
| | SD | 6.5 |
| | Minimum | 187 |
| | Maximum | 231 |
| | Skewness | -0.121 |
| | Kurtosis | 0.119 |
| | Coefficient of variation | 3.1% |
| | Percentiles | |
| | 1 st | 192 |
| | 2 nd | 195 |
| | 3 rd | 196 |
| | 5 th | 198 |
| | 10 th | 200 |
| | 15 th | 202 |
| | 20 th | 203 |
| | 25 th | 204 |
| | 30 th | 205 |
| | 35 th | 206 |
| | 40 th | 207 |
| | 45 th | 208 |
| | 50 th | 209 |
| | 55 th | 210 |
| | 60 th | 210 |
| | 65 th | 211 |
| | 70 th | 212 |
| | 75 th | 213 |
| | 80 th | 214 |
| | 85 th | 215 |
| | 90 th | 217 |
| | 95 th | 219 |
| | 97 th | 221 |
| | 98 th | 222 |
| | 99 th | 223 |

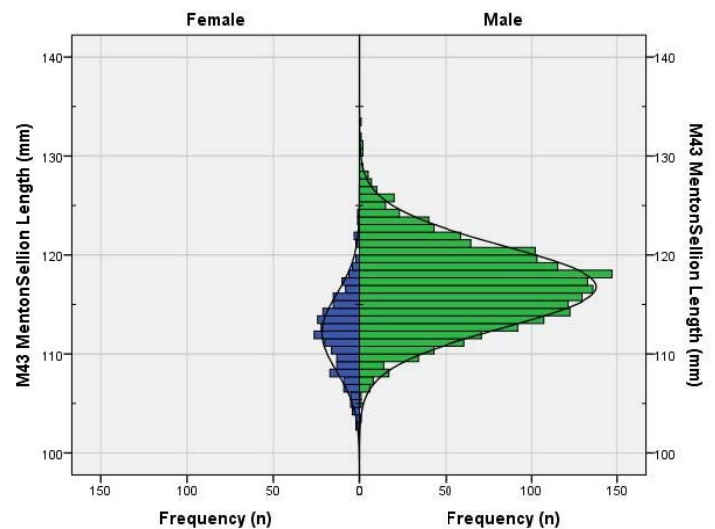
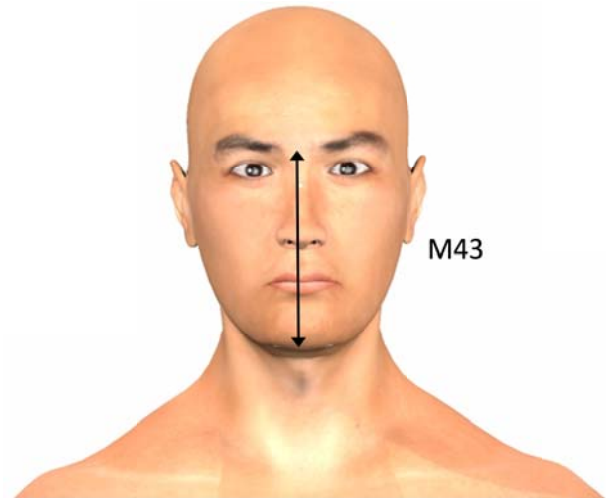


4.4.43 Menton-Sellion Length (M43)

Posture: Anthropometric Standing.

Definition: The point-to-point distance between the digitally-extracted Menton and Sellion landmarks.

| FEMALES | | MALES |
|-------------|--------------------------|-------|
| 276 | n | 1858 |
| 112 | Mean | 117 |
| 0.2 | SE (mean) | 0.1 |
| 3.9 | SD | 4.1 |
| 103 | Minimum | 104 |
| 124 | Maximum | 134 |
| 0.091 | Skewness | 0.197 |
| 0.102 | Kurtosis | 0.197 |
| 3.4% | Coefficient of variation | 3.5% |
| Percentiles | | |
| 103 | 1 st | 108 |
| 104 | 2 nd | 108 |
| 104 | 3 rd | 109 |
| 105 | 5 th | 110 |
| 107 | 10 th | 112 |
| 108 | 15 th | 113 |
| 109 | 20 th | 113 |
| 109 | 25 th | 114 |
| 110 | 30 th | 115 |
| 111 | 35 th | 115 |
| 111 | 40 th | 116 |
| 112 | 45 th | 116 |
| 112 | 50 th | 117 |
| 113 | 55 th | 117 |
| 113 | 60 th | 118 |
| 114 | 65 th | 118 |
| 114 | 70 th | 119 |
| 115 | 75 th | 120 |
| 115 | 80 th | 120 |
| 116 | 85 th | 121 |
| 117 | 90 th | 122 |
| 118 | 95 th | 124 |
| 119 | 97 th | 125 |
| 121 | 98 th | 126 |
| 122 | 99 th | 127 |

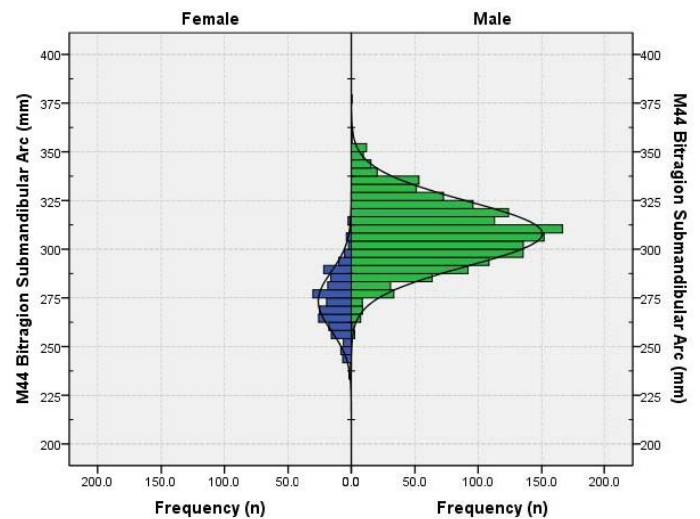
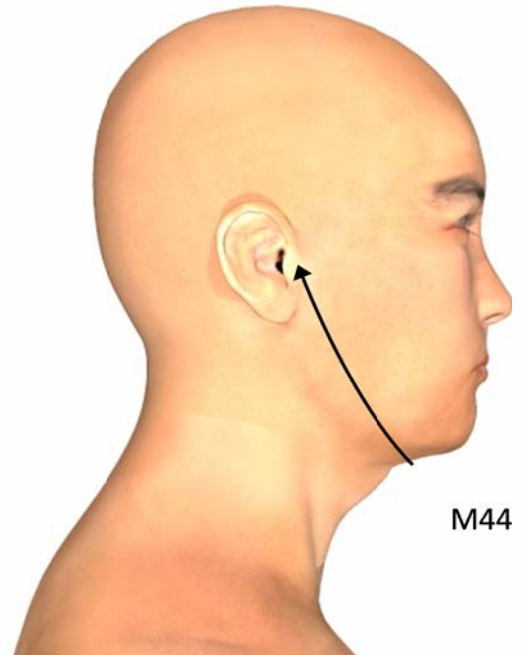


4.4.44 Bitragion Submandibular Arc (M44)

Posture: Anthropometric Standing with head in the Frankfort plane

Definition: The surface distance from the Tragon, Right landmark, through the Submandibular landmark, to the Tragon, Left landmark.

| FEMALES | | MALES |
|-------------|--------------------------|-------|
| 236 | n | 1516 |
| 273 | Mean | 308 |
| 1.0 | SE (mean) | 0.4 |
| 15.2 | SD | 16.7 |
| 234 | Minimum | 257 |
| 316 | Maximum | 377 |
| 0.112 | Skewness | 0.090 |
| -0.057 | Kurtosis | 0.038 |
| 5.5% | Coefficient of variation | 5.4% |
| Percentiles | | |
| 240 | 1 st | 267 |
| 245 | 2 nd | 275 |
| 245 | 3 rd | 278 |
| 247 | 5 th | 281 |
| 254 | 10 th | 287 |
| 257 | 15 th | 290 |
| 261 | 20 th | 294 |
| 263 | 25 th | 296 |
| 265 | 30 th | 299 |
| 267 | 35 th | 301 |
| 268 | 40 th | 304 |
| 271 | 45 th | 306 |
| 272 | 50 th | 308 |
| 276 | 55 th | 310 |
| 277 | 60 th | 312 |
| 279 | 65 th | 314 |
| 281 | 70 th | 317 |
| 284 | 75 th | 319 |
| 287 | 80 th | 322 |
| 290 | 85 th | 325 |
| 292 | 90 th | 330 |
| 298 | 95 th | 336 |
| 305 | 97 th | 339 |
| 307 | 98 th | 344 |
| 314 | 99 th | 349 |

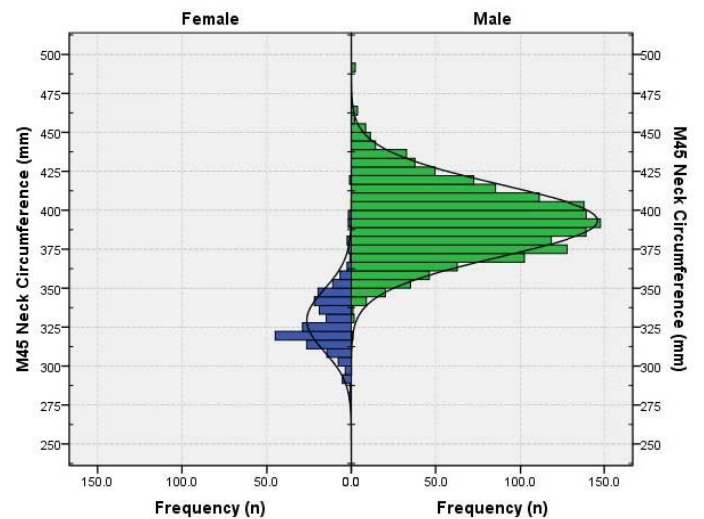
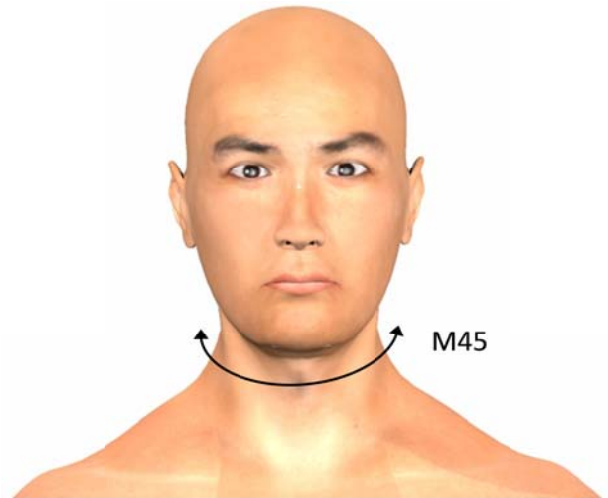


4.4.45 Neck Circumference, Mid (M45)

Posture: Anthropometric Standing with the head in the Frankfort plane.

Definition: The circumference of the neck at the height of the Infrathyroid landmark. The plane of the measurement is perpendicular to the long axis of the neck.

| FEMALES | | MALES |
|-------------|--------------------------|-------|
| 236 | n | 1519 |
| 329 | Mean | 393 |
| 1.3 | SE (mean) | 0.6 |
| 20.0 | SD | 23.0 |
| 282 | Minimum | 317 |
| 419 | Maximum | 493 |
| 0.900 | Skewness | 0.290 |
| 2.097 | Kurtosis | 0.253 |
| 6.1% | Coefficient of variation | 5.9% |
| Percentiles | | |
| 289 | 1 st | 347 |
| 291 | 2 nd | 349 |
| 295 | 3 rd | 352 |
| 301 | 5 th | 356 |
| 307 | 10 th | 365 |
| 312 | 15 th | 370 |
| 314 | 20 th | 373 |
| 317 | 25 th | 377 |
| 319 | 30 th | 380 |
| 320 | 35 th | 384 |
| 321 | 40 th | 387 |
| 324 | 45 th | 390 |
| 326 | 50 th | 393 |
| 328 | 55 th | 396 |
| 331 | 60 th | 398 |
| 336 | 65 th | 401 |
| 339 | 70 th | 405 |
| 342 | 75 th | 408 |
| 345 | 80 th | 412 |
| 347 | 85 th | 417 |
| 353 | 90 th | 424 |
| 362 | 95 th | 433 |
| 377 | 97 th | 438 |
| 388 | 98 th | 444 |
| 395 | 99 th | 453 |

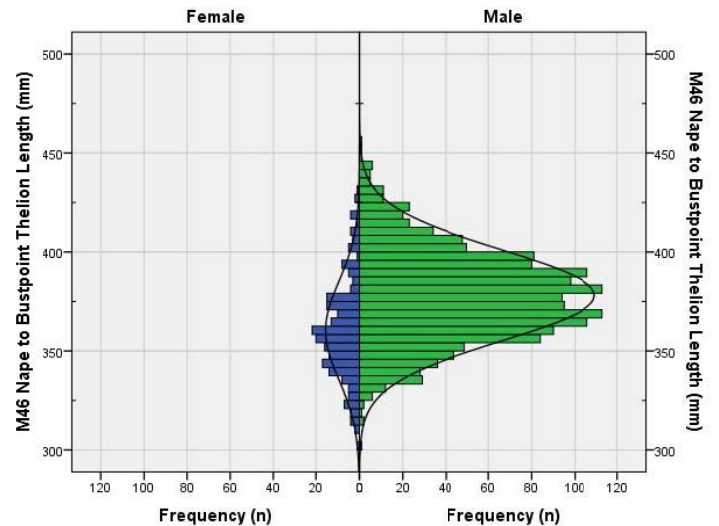


4.4.46 Nape to Bustpoint Thelion Length (M46)

Posture: Anthropometric Standing.

Definition: The surface distance from the Cervicale landmark, across the Trapezius Point, Right landmark, to the Thelion (males) or Bustpoint (females) landmarks.

| FEMALES | | MALES |
|-------------|--------------------------|--------|
| 236 | n | 1519 |
| 360 | Mean | 378 |
| 1.6 | SE (mean) | 0.6 |
| 24.4 | SD | 22.9 |
| 303 | Minimum | 304 |
| 432 | Maximum | 456 |
| 0.396 | Skewness | 0.200 |
| 0.286 | Kurtosis | -0.026 |
| 6.8% | Coefficient of variation | 6.1% |
| Percentiles | | |
| 309 | 1 st | 330 |
| 314 | 2 nd | 335 |
| 315 | 3 rd | 337 |
| 321 | 5 th | 341 |
| 330 | 10 th | 348 |
| 338 | 15 th | 355 |
| 341 | 20 th | 359 |
| 344 | 25 th | 362 |
| 348 | 30 th | 365 |
| 351 | 35 th | 368 |
| 354 | 40 th | 371 |
| 356 | 45 th | 374 |
| 358 | 50 th | 378 |
| 360 | 55 th | 381 |
| 364 | 60 th | 384 |
| 367 | 65 th | 387 |
| 372 | 70 th | 390 |
| 375 | 75 th | 393 |
| 377 | 80 th | 397 |
| 384 | 85 th | 401 |
| 394 | 90 th | 408 |
| 407 | 95 th | 418 |
| 417 | 97 th | 424 |
| 420 | 98 th | 429 |
| 427 | 99 th | 438 |

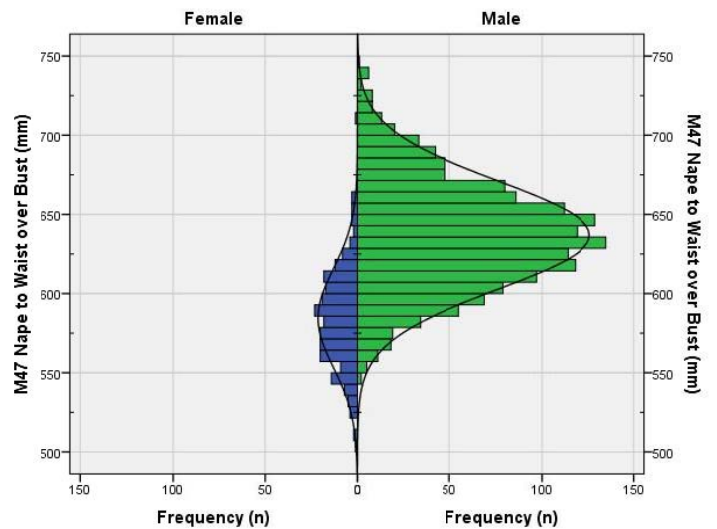
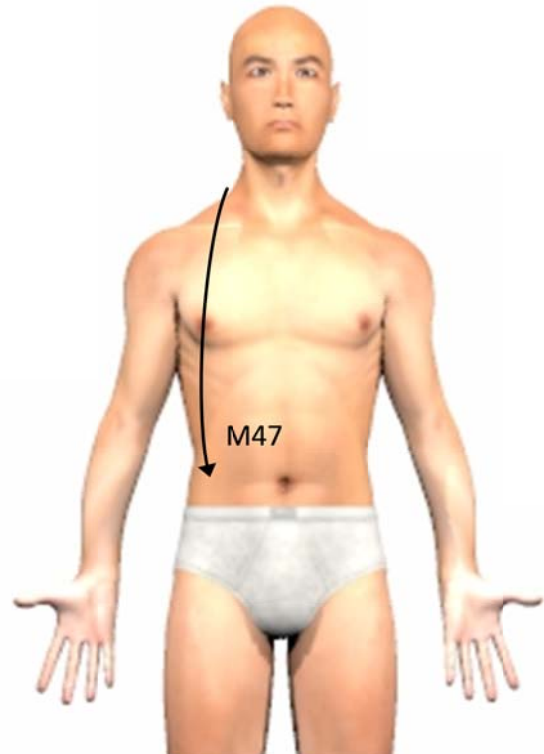


4.4.47 Nape to Waist Over Bust (M47)

Posture: Anthropometric Standing.

Definition: The surface distance from the Cervicale landmark, across the Trapezius Point, Right landmark, across the Thelion (males) or Bustpoint (females) landmarks, to the Waist Preferred Posterior, Projected landmark.

| FEMALES | | MALES |
|-------------|--------------------------|--------|
| 236 | n | 1519 |
| 584 | Mean | 637 |
| 2.1 | SE (mean) | 0.9 |
| 31.9 | SD | 33.8 |
| 500 | Minimum | 546 |
| 710 | Maximum | 747 |
| 0.246 | Skewness | 0.254 |
| 0.375 | Kurtosis | -0.025 |
| 5.5% | Coefficient of variation | 5.3% |
| Percentiles | | |
| 511 | 1 st | 563 |
| 521 | 2 nd | 570 |
| 527 | 3 rd | 575 |
| 532 | 5 th | 585 |
| 545 | 10 th | 594 |
| 549 | 15 th | 601 |
| 558 | 20 th | 608 |
| 562 | 25 th | 613 |
| 567 | 30 th | 619 |
| 569 | 35 th | 623 |
| 576 | 40 th | 627 |
| 578 | 45 th | 630 |
| 582 | 50 th | 635 |
| 588 | 55 th | 640 |
| 592 | 60 th | 644 |
| 596 | 65 th | 647 |
| 601 | 70 th | 652 |
| 605 | 75 th | 658 |
| 609 | 80 th | 664 |
| 615 | 85 th | 671 |
| 622 | 90 th | 681 |
| 637 | 95 th | 696 |
| 650 | 97 th | 707 |
| 656 | 98 th | 714 |
| 663 | 99 th | 722 |



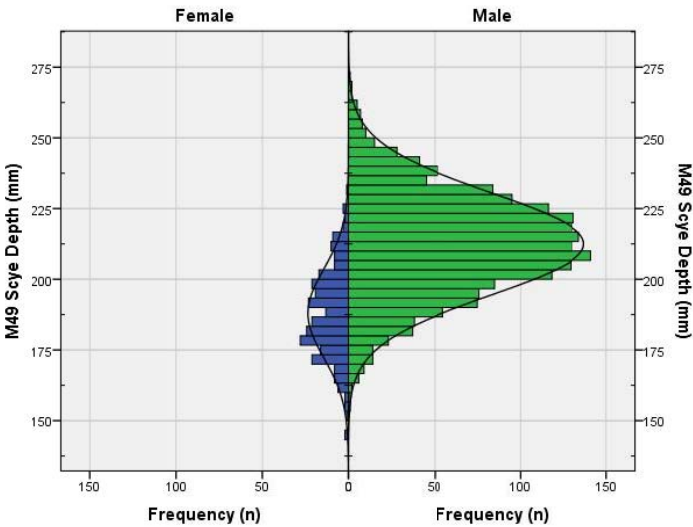
4.4.48 Scye Depth (M49)

Posture: Anthropometric Standing.

Definition: The contour distance between the digitally-extracted Cervicale and Scye Level at Midspine landmarks.



| FEMALES | | MALES |
|-------------|--------------------------|--------|
| 276 | n | 1860 |
| 188 | Mean | 213 |
| 0.9 | SE (mean) | 0.4 |
| 15.4 | SD | 18.2 |
| 145 | Minimum | 153 |
| 233 | Maximum | 271 |
| 0.180 | Skewness | -0.019 |
| -0.223 | Kurtosis | 0.013 |
| 8.2% | Coefficient of variation | 8.6% |
| Percentiles | | |
| 153 | 1 st | 170 |
| 158 | 2 nd | 174 |
| 162 | 3 rd | 177 |
| 164 | 5 th | 182 |
| 170 | 10 th | 189 |
| 173 | 15 th | 193 |
| 175 | 20 th | 198 |
| 178 | 25 th | 201 |
| 179 | 30 th | 204 |
| 181 | 35 th | 206 |
| 183 | 40 th | 208 |
| 185 | 45 th | 211 |
| 187 | 50 th | 213 |
| 190 | 55 th | 215 |
| 193 | 60 th | 217 |
| 194 | 65 th | 220 |
| 196 | 70 th | 222 |
| 199 | 75 th | 225 |
| 201 | 80 th | 228 |
| 205 | 85 th | 231 |
| 212 | 90 th | 236 |
| 215 | 95 th | 243 |
| 218 | 97 th | 247 |
| 221 | 98 th | 250 |
| 225 | 99 th | 257 |

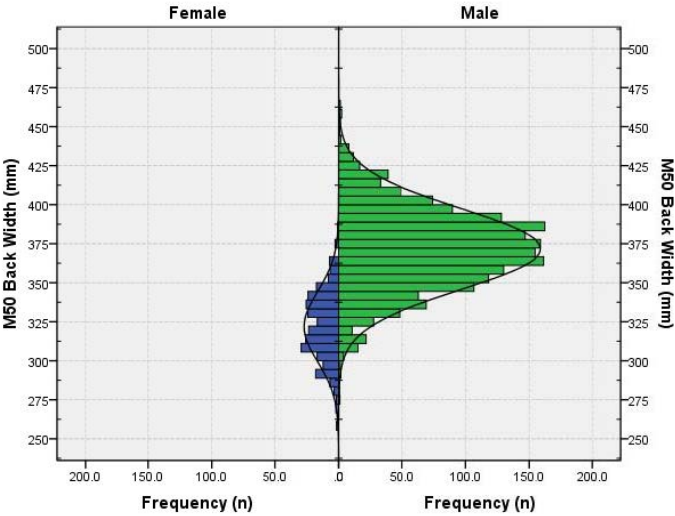


4.4.49 Back Width (M50)

Posture: Anthropometric Standing.
Definition: The point-to-point distance between the digitally-extracted Posterior Horizontal Scye, Left and Posterior Horizontal Scye, Right landmarks.



| FEMALES | | MALES |
|-------------|--------------------------|--------|
| 276 | n | 1861 |
| 322 | Mean | 372 |
| 1.4 | SE (mean) | 0.6 |
| 22.6 | SD | 25.9 |
| 259 | Minimum | 276 |
| 388 | Maximum | 463 |
| -0.043 | Skewness | -0.043 |
| -0.153 | Kurtosis | 0.190 |
| 7.0% | Coefficient of variation | 7.0% |
| Percentiles | | |
| 265 | 1 st | 310 |
| 274 | 2 nd | 313 |
| 280 | 3 rd | 322 |
| 287 | 5 th | 330 |
| 292 | 10 th | 338 |
| 298 | 15 th | 345 |
| 303 | 20 th | 350 |
| 306 | 25 th | 354 |
| 310 | 30 th | 359 |
| 312 | 35 th | 362 |
| 315 | 40 th | 366 |
| 318 | 45 th | 369 |
| 321 | 50 th | 372 |
| 324 | 55 th | 375 |
| 329 | 60 th | 379 |
| 332 | 65 th | 382 |
| 336 | 70 th | 385 |
| 339 | 75 th | 388 |
| 342 | 80 th | 393 |
| 345 | 85 th | 398 |
| 349 | 90 th | 404 |
| 359 | 95 th | 415 |
| 363 | 97 th | 421 |
| 366 | 98 th | 425 |
| 376 | 99 th | 431 |

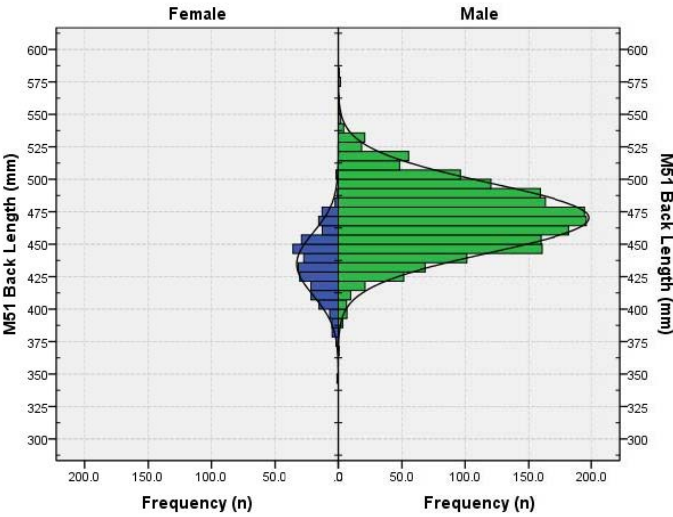


4.4.50 Back Length (M51)

Posture: Anthropometric Standing.

Definition: The contour distance between the digitally-extracted Cervicale and Back Length Marker landmarks.

| FEMALES | | MALES |
|-------------|--------------------------|-------|
| 276 | n | 1854 |
| 435 | Mean | 470 |
| 1.5 | SE (mean) | 0.6 |
| 24.1 | SD | 26.7 |
| 348 | Minimum | 371 |
| 506 | Maximum | 580 |
| -0.173 | Skewness | 0.088 |
| 0.222 | Kurtosis | 0.170 |
| 5.5% | Coefficient of variation | 5.7% |
| Percentiles | | |
| 377 | 1 st | 409 |
| 383 | 2 nd | 416 |
| 387 | 3 rd | 423 |
| 394 | 5 th | 428 |
| 404 | 10 th | 437 |
| 410 | 15 th | 443 |
| 413 | 20 th | 448 |
| 419 | 25 th | 452 |
| 423 | 30 th | 455 |
| 425 | 35 th | 459 |
| 429 | 40 th | 463 |
| 432 | 45 th | 467 |
| 435 | 50 th | 470 |
| 439 | 55 th | 474 |
| 443 | 60 th | 477 |
| 446 | 65 th | 481 |
| 448 | 70 th | 484 |
| 452 | 75 th | 489 |
| 455 | 80 th | 493 |
| 458 | 85 th | 498 |
| 467 | 90 th | 504 |
| 475 | 95 th | 515 |
| 477 | 97 th | 520 |
| 478 | 98 th | 525 |
| 488 | 99 th | 532 |

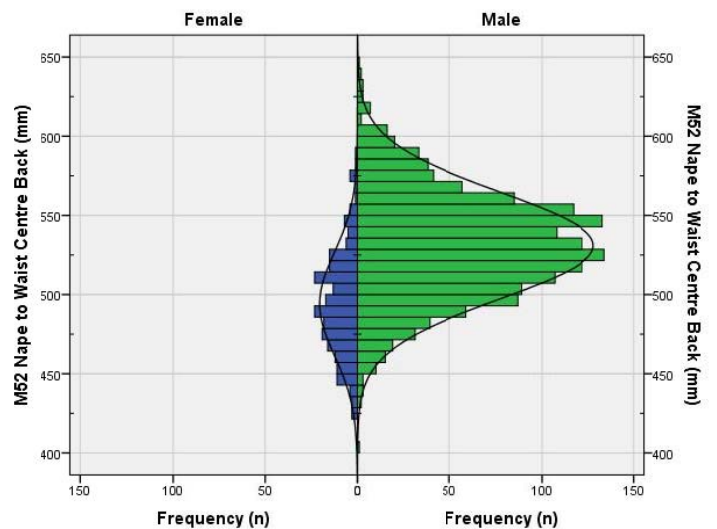
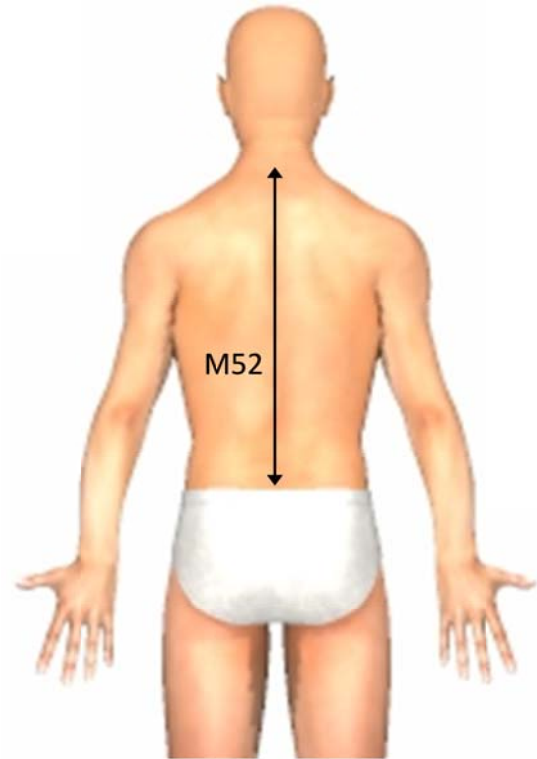


4.4.51 Nape to Waist Centre Back (M52)

Posture: Anthropometric Standing.

Definition: The surface distance from the digitally extracted Cervicale landmark to the Waist Preferred, Posterior landmark

| FEMALES | | MALES |
|-------------|--------------------------|-------|
| 236 | n | 1519 |
| 493 | Mean | 531 |
| 2.2 | SE (mean) | 0.9 |
| 33.3 | SD | 33.9 |
| 423 | Minimum | 402 |
| 590 | Maximum | 647 |
| 0.317 | Skewness | 0.068 |
| -0.069 | Kurtosis | 0.192 |
| 6.8% | Coefficient of variation | 6.4% |
| Percentiles | | |
| 427 | 1 st | 450 |
| 430 | 2 nd | 460 |
| 436 | 3 rd | 468 |
| 442 | 5 th | 475 |
| 449 | 10 th | 489 |
| 457 | 15 th | 497 |
| 464 | 20 th | 502 |
| 470 | 25 th | 509 |
| 475 | 30 th | 513 |
| 478 | 35 th | 518 |
| 484 | 40 th | 522 |
| 488 | 45 th | 527 |
| 492 | 50 th | 531 |
| 498 | 55 th | 535 |
| 502 | 60 th | 540 |
| 506 | 65 th | 545 |
| 509 | 70 th | 549 |
| 514 | 75 th | 554 |
| 519 | 80 th | 558 |
| 525 | 85 th | 565 |
| 540 | 90 th | 573 |
| 551 | 95 th | 587 |
| 571 | 97 th | 595 |
| 576 | 98 th | 602 |
| 580 | 99 th | 619 |



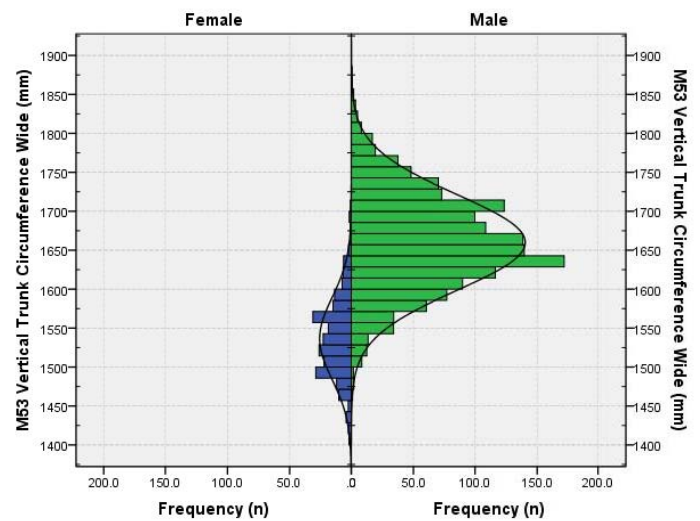
4.4.52 Vertical Trunk Circumference (M53)

Posture: Anthropometric Standing.

Definition: The circumference of the trunk on a line passing through the Crotch landmark and over Bustpoint (females)/Thelion (males), Midshoulder, and Buttock Point, Posterior landmarks.



| FEMALES | | MALES |
|-------------|--------------------------|--------|
| 235 | n | 1519 |
| 1537 | Mean | 1660 |
| 3.4 | SE (mean) | 1.6 |
| 52.6 | SD | 61.7 |
| 1407 | Minimum | 1469 |
| 1707 | Maximum | 1881 |
| 0.276 | Skewness | 0.104 |
| 0.205 | Kurtosis | -0.005 |
| 3.4% | Coefficient of variation | 3.7% |
| Percentiles | | |
| 1413 | 1 st | 1517 |
| 1429 | 2 nd | 1532 |
| 1442 | 3 rd | 1547 |
| 1458 | 5 th | 1558 |
| 1472 | 10 th | 1582 |
| 1487 | 15 th | 1597 |
| 1493 | 20 th | 1610 |
| 1500 | 25 th | 1619 |
| 1505 | 30 th | 1629 |
| 1513 | 35 th | 1635 |
| 1519 | 40 th | 1641 |
| 1526 | 45 th | 1649 |
| 1535 | 50 th | 1657 |
| 1542 | 55 th | 1666 |
| 1549 | 60 th | 1673 |
| 1558 | 65 th | 1682 |
| 1564 | 70 th | 1693 |
| 1570 | 75 th | 1703 |
| 1579 | 80 th | 1712 |
| 1590 | 85 th | 1725 |
| 1606 | 90 th | 1741 |
| 1632 | 95 th | 1763 |
| 1641 | 97 th | 1780 |
| 1655 | 98 th | 1789 |
| 1690 | 99 th | 1808 |

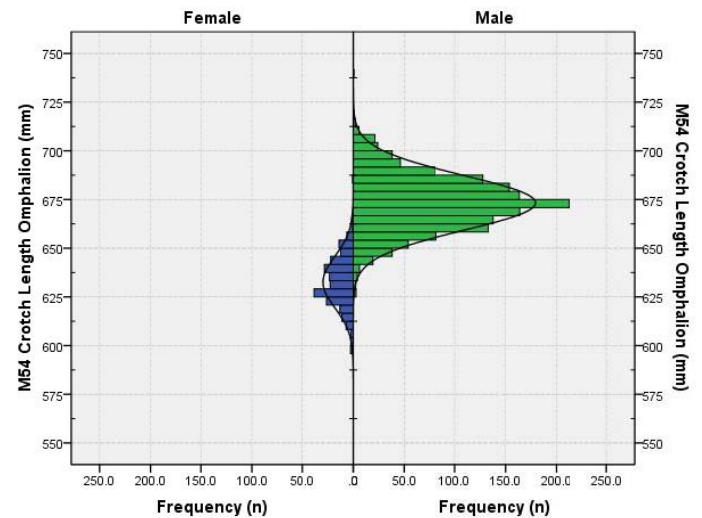


4.4.53 Crotch Length Omphalion (M54)

Posture: Anthropometric Standing.

Definition: The surface distance between the Waist Omphalion, Anterior and the Waist Omphalion, Posterior landmarks, passing through the Crotch landmark.

| FEMALES | | MALES |
|-------------|--------------------------|-------|
| 236 | n | 1519 |
| 633 | Mean | 673 |
| 0.9 | SE (mean) | 0.4 |
| 13.2 | SD | 14.1 |
| 597 | Minimum | 626 |
| 686 | Maximum | 741 |
| 0.063 | Skewness | 0.086 |
| 0.384 | Kurtosis | 0.233 |
| 2.1% | Coefficient of variation | 2.1% |
| Percentiles | | |
| 599 | 1 st | 642 |
| 601 | 2 nd | 645 |
| 608 | 3 rd | 647 |
| 611 | 5 th | 650 |
| 616 | 10 th | 655 |
| 620 | 15 th | 659 |
| 622 | 20 th | 662 |
| 624 | 25 th | 664 |
| 626 | 30 th | 666 |
| 627 | 35 th | 668 |
| 629 | 40 th | 670 |
| 630 | 45 th | 672 |
| 631 | 50 th | 674 |
| 634 | 55 th | 675 |
| 636 | 60 th | 676 |
| 638 | 65 th | 678 |
| 640 | 70 th | 680 |
| 642 | 75 th | 682 |
| 644 | 80 th | 685 |
| 647 | 85 th | 687 |
| 651 | 90 th | 691 |
| 653 | 95 th | 697 |
| 656 | 97 th | 701 |
| 657 | 98 th | 704 |
| 663 | 99 th | 708 |

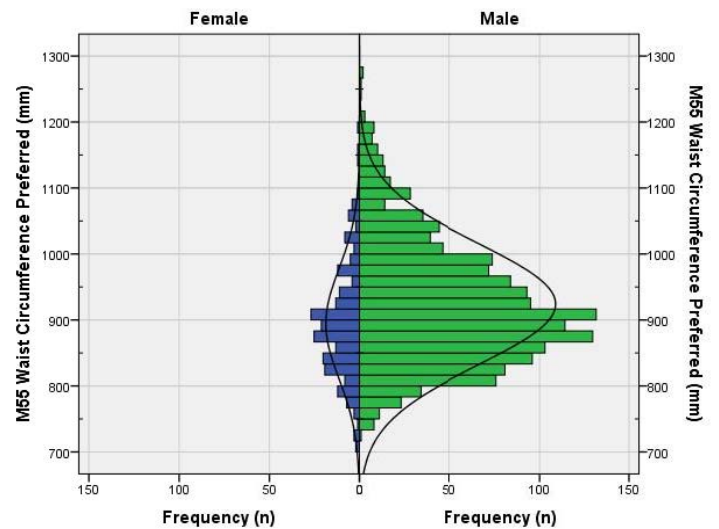
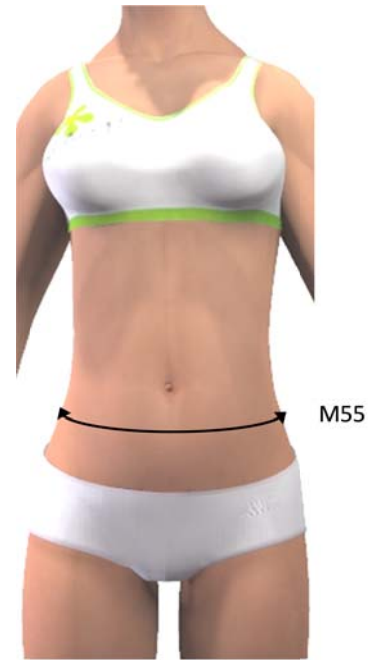


4.4.54 Waist Circumference (Preferred) (M55)

Posture: Anthropometric Standing.

Definition: The horizontal circumference of the torso at the height of the Waist Preferred, Posterior landmark.

| FEMALES | | MALES |
|-------------|--------------------------|-------|
| 236 | n | 1519 |
| 894 | Mean | 924 |
| 5.5 | SE (mean) | 2.3 |
| 85.0 | SD | 91.2 |
| 711 | Minimum | 730 |
| 1189 | Maximum | 1282 |
| 0.489 | Skewness | 0.757 |
| 0.441 | Kurtosis | 0.582 |
| 9.5% | Coefficient of variation | 9.9% |
| Percentiles | | |
| 715 | 1 st | 763 |
| 722 | 2 nd | 779 |
| 732 | 3 rd | 786 |
| 768 | 5 th | 799 |
| 794 | 10 th | 818 |
| 808 | 15 th | 833 |
| 825 | 20 th | 845 |
| 836 | 25 th | 858 |
| 849 | 30 th | 870 |
| 862 | 35 th | 880 |
| 874 | 40 th | 890 |
| 881 | 45 th | 901 |
| 889 | 50 th | 910 |
| 898 | 55 th | 920 |
| 908 | 60 th | 934 |
| 913 | 65 th | 947 |
| 920 | 70 th | 963 |
| 938 | 75 th | 977 |
| 963 | 80 th | 993 |
| 980 | 85 th | 1017 |
| 1020 | 90 th | 1049 |
| 1056 | 95 th | 1098 |
| 1066 | 97 th | 1131 |
| 1080 | 98 th | 1157 |
| 1150 | 99 th | 1186 |



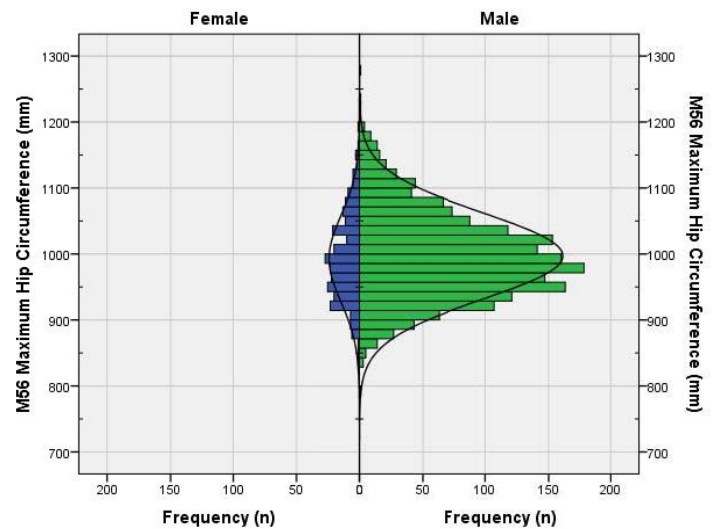
4.4.55 Maximum Hip Circumference (M56)

Posture: Anthropometric Standing.

Definition: The maximum circumference of the body (excluding the appendages) at or about the height of the hip. This measure must be taken below the height of the iliac crest.



| FEMALES | | MALES |
|-------------|--------------------------|-------|
| 275 | n | 1856 |
| 992 | Mean | 997 |
| 3.9 | SE (mean) | 1.5 |
| 65.4 | SD | 65.2 |
| 838 | Minimum | 786 |
| 1194 | Maximum | 1281 |
| 0.334 | Skewness | 0.453 |
| -0.298 | Kurtosis | 0.241 |
| 6.6% | Coefficient of variation | 6.5% |
| Percentiles | | |
| 867 | 1 st | 865 |
| 877 | 2 nd | 880 |
| 879 | 3 rd | 888 |
| 891 | 5 th | 899 |
| 917 | 10 th | 919 |
| 923 | 15 th | 931 |
| 936 | 20 th | 942 |
| 944 | 25 th | 952 |
| 953 | 30 th | 960 |
| 964 | 35 th | 968 |
| 971 | 40 th | 977 |
| 978 | 45 th | 984 |
| 987 | 50 th | 991 |
| 992 | 55 th | 1000 |
| 1001 | 60 th | 1010 |
| 1011 | 65 th | 1017 |
| 1028 | 70 th | 1026 |
| 1037 | 75 th | 1035 |
| 1051 | 80 th | 1049 |
| 1070 | 85 th | 1066 |
| 1081 | 90 th | 1085 |
| 1109 | 95 th | 1116 |
| 1122 | 97 th | 1137 |
| 1144 | 98 th | 1149 |
| 1153 | 99 th | 1169 |



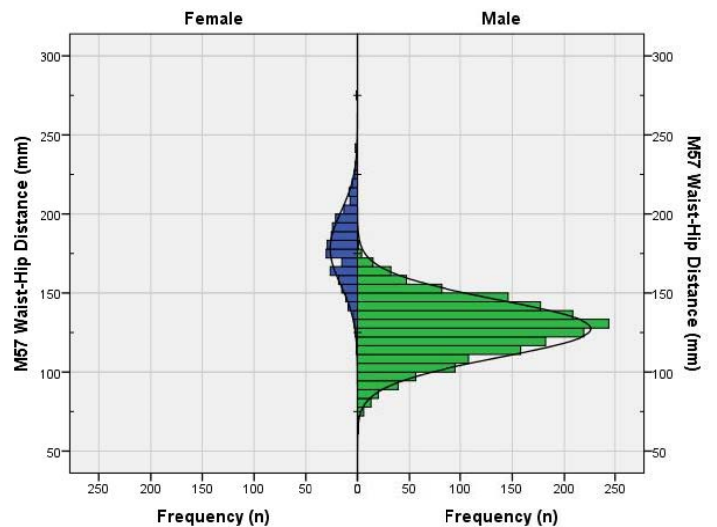
4.4.56 Waist-Hip Distance (M57)

Posture: Anthropometric Standing.

Definition: The contoured distance between the digitally-extracted Waist Preferred, Anterior and Hip Marker landmarks, vertically aligned with the Iliocristale, Right landmark.



| FEMALES | | MALES |
|-------------|--------------------------|--------|
| 275 | n | 1855 |
| 178 | Mean | 127 |
| 1.4 | SE (mean) | 0.4 |
| 23.9 | SD | 18.2 |
| 114 | Minimum | 63 |
| 275 | Maximum | 180 |
| 0.292 | Skewness | -0.242 |
| 1.192 | Kurtosis | -0.005 |
| 13.4% | Coefficient of variation | 14.3% |
| Percentiles | | |
| 122 | 1 st | 82 |
| 129 | 2 nd | 87 |
| 134 | 3 rd | 91 |
| 140 | 5 th | 95 |
| 148 | 10 th | 104 |
| 156 | 15 th | 109 |
| 158 | 20 th | 112 |
| 163 | 25 th | 115 |
| 166 | 30 th | 119 |
| 170 | 35 th | 121 |
| 173 | 40 th | 123 |
| 177 | 45 th | 126 |
| 179 | 50 th | 128 |
| 181 | 55 th | 131 |
| 184 | 60 th | 133 |
| 187 | 65 th | 135 |
| 191 | 70 th | 138 |
| 193 | 75 th | 140 |
| 196 | 80 th | 143 |
| 200 | 85 th | 146 |
| 206 | 90 th | 150 |
| 218 | 95 th | 156 |
| 224 | 97 th | 161 |
| 230 | 98 th | 163 |
| 244 | 99 th | 168 |



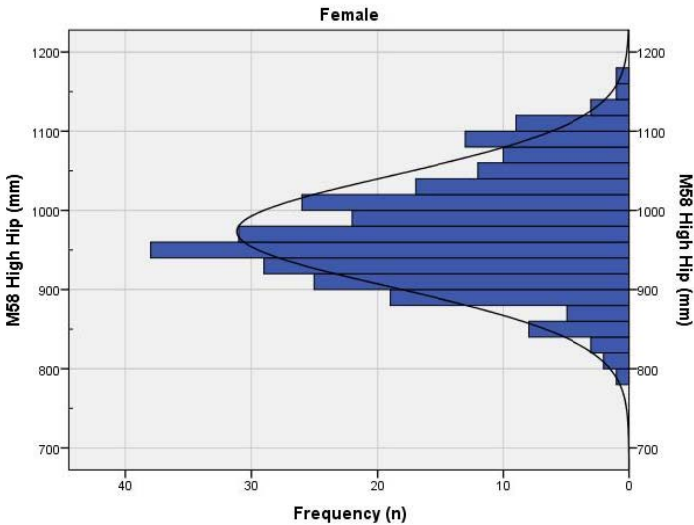
4.4.57 High Hip Circumference (M58)

Posture: Anthropometric Standing.

Definition: The horizontal circumference measured at the height of the digitally-extracted High Hip Marker (females only).

| FEMALES | | MALES |
|---------|--------------------------|-------|
| 275 | n | |
| 973 | Mean | |
| 4.3 | SE (mean) | |
| 71.1 | SD | |
| 800 | Minimum | |
| 1163 | Maximum | |
| .190 | Skewness | |
| -.304 | Kurtosis | |
| 7.3% | Coefficient of variation | |
| | Percentiles | |
| 817 | 1 st | |
| 826 | 2 nd | |
| 840 | 3 rd | |
| 857 | 5 th | |
| 889 | 10 th | |
| 900 | 15 th | |
| 914 | 20 th | |
| 923 | 25 th | |
| 936 | 30 th | |
| 945 | 35 th | |
| 951 | 40 th | |
| 957 | 45 th | |
| 961 | 50 th | |
| 973 | 55 th | |
| 983 | 60 th | |
| 995 | 65 th | |
| 1010 | 70 th | |
| 1018 | 75 th | |
| 1033 | 80 th | |
| 1055 | 85 th | |
| 1079 | 90 th | |
| 1101 | 95 th | |
| 1111 | 97 th | |
| 1115 | 98 th | |
| 1139 | 99 th | |

Not
measured

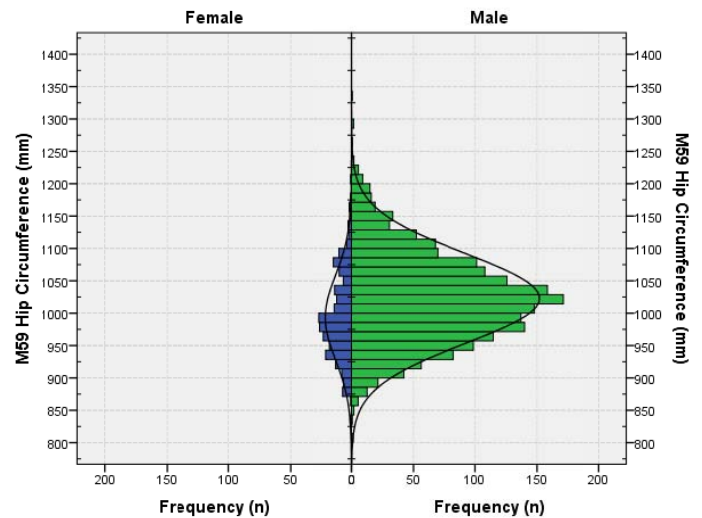


4.4.58 Hip Circumference (M59)

Posture: Anthropometric Standing.

Definition: The horizontal circumference of the torso at the height of the digitally-extracted Hip Marker landmark.

| FEMALES | | MALES |
|-------------|--------------------------|-------|
| 243 | n | 1850 |
| 993 | Mean | 1023 |
| 4.2 | SE (mean) | 1.6 |
| 65.6 | SD | 69.4 |
| 841 | Minimum | 809 |
| 1200 | Maximum | 1340 |
| 0.424 | Skewness | 0.384 |
| -0.142 | Kurtosis | 0.224 |
| 6.6% | Coefficient of variation | 6.8% |
| Percentiles | | |
| 870 | 1 st | 881 |
| 875 | 2 nd | 897 |
| 884 | 3 rd | 906 |
| 892 | 5 th | 916 |
| 916 | 10 th | 938 |
| 929 | 15 th | 952 |
| 937 | 20 th | 964 |
| 945 | 25 th | 974 |
| 954 | 30 th | 984 |
| 965 | 35 th | 993 |
| 972 | 40 th | 1003 |
| 980 | 45 th | 1011 |
| 985 | 50 th | 1020 |
| 994 | 55 th | 1027 |
| 998 | 60 th | 1036 |
| 1009 | 65 th | 1044 |
| 1024 | 70 th | 1055 |
| 1036 | 75 th | 1066 |
| 1057 | 80 th | 1078 |
| 1075 | 85 th | 1094 |
| 1085 | 90 th | 1115 |
| 1105 | 95 th | 1147 |
| 1130 | 97 th | 1168 |
| 1145 | 98 th | 1185 |
| 1161 | 99 th | 1205 |



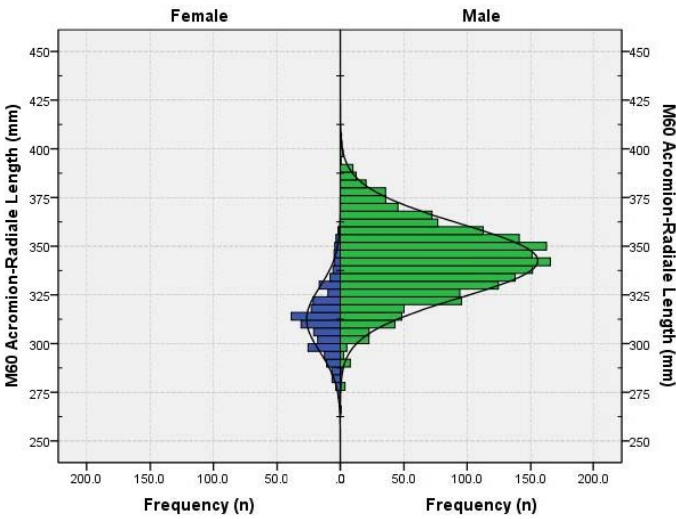
4.4.59 Acromion-Radiale Length (M60)

Posture: Anthropometric Standing.

Definition: The point-to-point distance between the digitally-extracted Acromion, Right and Radiale Digital landmarks.



| FEMALES | | MALES |
|-------------|--------------------------|--------|
| 276 | n | 1857 |
| 312 | Mean | 343 |
| 1.0 | SE (mean) | 0.4 |
| 16.7 | SD | 19.0 |
| 274 | Minimum | 267 |
| 358 | Maximum | 405 |
| 0.311 | Skewness | -0.052 |
| 0.041 | Kurtosis | 0.157 |
| 5.3% | Coefficient of variation | 5.6% |
| Percentiles | | |
| 278 | 1 st | 299 |
| 280 | 2 nd | 303 |
| 283 | 3 rd | 306 |
| 286 | 5 th | 310 |
| 291 | 10 th | 318 |
| 296 | 15 th | 323 |
| 299 | 20 th | 327 |
| 300 | 25 th | 330 |
| 303 | 30 th | 333 |
| 307 | 35 th | 336 |
| 309 | 40 th | 338 |
| 310 | 45 th | 340 |
| 312 | 50 th | 343 |
| 313 | 55 th | 345 |
| 315 | 60 th | 348 |
| 317 | 65 th | 350 |
| 319 | 70 th | 352 |
| 322 | 75 th | 355 |
| 325 | 80 th | 358 |
| 331 | 85 th | 362 |
| 334 | 90 th | 367 |
| 345 | 95 th | 375 |
| 351 | 97 th | 379 |
| 352 | 98 th | 383 |
| 354 | 99 th | 387 |

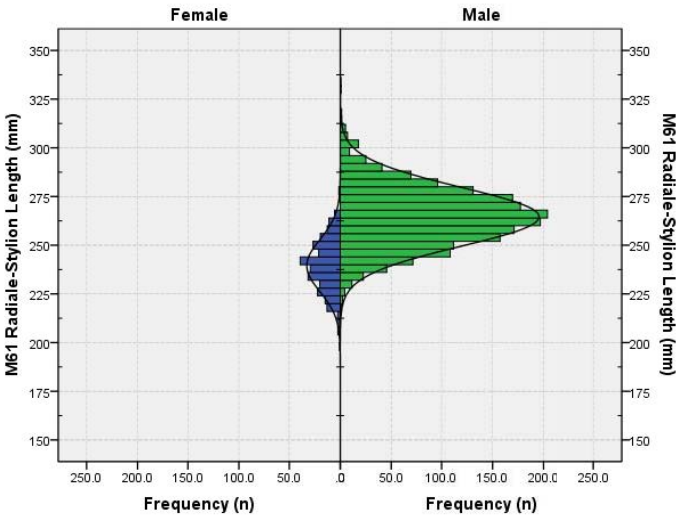


4.4.60 Radiale-Stylian Length (M61)

Posture: Anthropometric Standing.

Definition: The point-to-point distance between the digitally-extracted Radiale and the Stylian landmarks.

| FEMALES | | MALES |
|-------------|--------------------------|-------|
| 276 | n | 1861 |
| 240 | Mean | 265 |
| 0.8 | SE (mean) | 0.4 |
| 13.4 | SD | 15.2 |
| 196 | Minimum | 220 |
| 277 | Maximum | 334 |
| -0.059 | Skewness | 0.219 |
| -0.140 | Kurtosis | 0.273 |
| 5.6% | Coefficient of variation | 5.7% |
| Percentiles | | |
| 207 | 1 st | 231 |
| 213 | 2 nd | 235 |
| 216 | 3 rd | 238 |
| 218 | 5 th | 240 |
| 221 | 10 th | 245 |
| 225 | 15 th | 248 |
| 228 | 20 th | 252 |
| 231 | 25 th | 254 |
| 232 | 30 th | 257 |
| 234 | 35 th | 259 |
| 236 | 40 th | 261 |
| 238 | 45 th | 263 |
| 240 | 50 th | 264 |
| 242 | 55 th | 266 |
| 243 | 60 th | 268 |
| 244 | 65 th | 270 |
| 247 | 70 th | 272 |
| 249 | 75 th | 275 |
| 251 | 80 th | 277 |
| 255 | 85 th | 280 |
| 257 | 90 th | 283 |
| 262 | 95 th | 289 |
| 264 | 97 th | 294 |
| 265 | 98 th | 299 |
| 271 | 99 th | 304 |



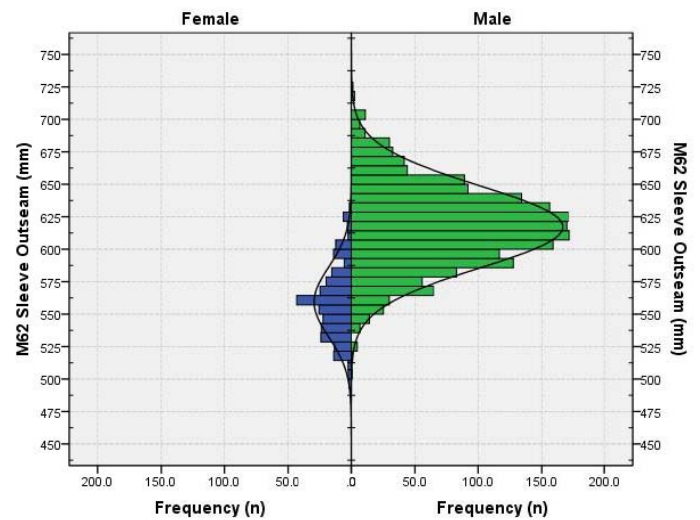
4.4.61 Sleeve Outseam (M62)

Posture: Anthropometric Standing.

Definition: The contour distance between the digitally-extracted Acromion, Right and Centre Wrist Marker landmarks, passing over the Radiale landmark.



| FEMALES | | MALES |
|-------------|--------------------------|-------|
| 276 | n | 1855 |
| 559 | Mean | 617 |
| 1.6 | SE (mean) | 0.7 |
| 27.0 | SD | 31.7 |
| 487 | Minimum | 506 |
| 634 | Maximum | 727 |
| 0.324 | Skewness | 0.087 |
| -0.077 | Kurtosis | 0.113 |
| 4.8% | Coefficient of variation | 5.1% |
| Percentiles | | |
| 500 | 1 st | 546 |
| 511 | 2 nd | 552 |
| 515 | 3 rd | 558 |
| 519 | 5 th | 566 |
| 526 | 10 th | 576 |
| 531 | 15 th | 585 |
| 535 | 20 th | 591 |
| 540 | 25 th | 596 |
| 544 | 30 th | 601 |
| 548 | 35 th | 605 |
| 554 | 40 th | 609 |
| 557 | 45 th | 613 |
| 558 | 50 th | 617 |
| 561 | 55 th | 621 |
| 563 | 60 th | 625 |
| 566 | 65 th | 629 |
| 570 | 70 th | 633 |
| 575 | 75 th | 637 |
| 580 | 80 th | 642 |
| 589 | 85 th | 650 |
| 598 | 90 th | 657 |
| 605 | 95 th | 672 |
| 620 | 97 th | 679 |
| 623 | 98 th | 684 |
| 627 | 99 th | 696 |

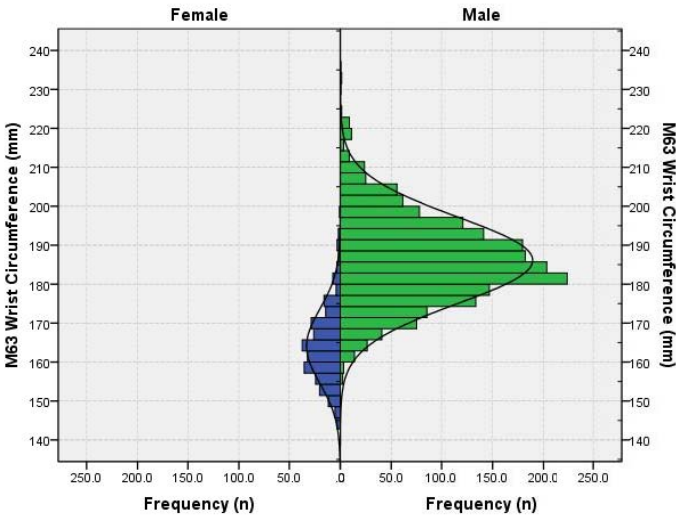
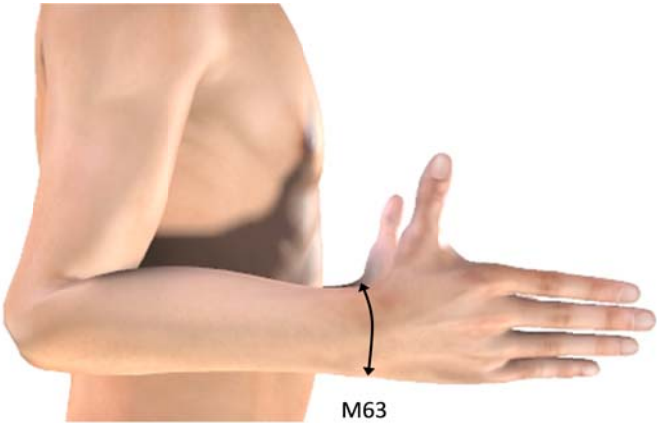


4.4.62 Wrist Circumference (M63)

Posture: Anthropometric Standing.

Definition: The circumference around the wrist at the height of the Stylium landmark, perpendicular to the long axis of the forearm.

| FEMALES | | MALES |
|-------------|--------------------------|-------|
| 276 | n | 1859 |
| 164 | Mean | 186 |
| 0.6 | SE (mean) | 0.3 |
| 9.5 | SD | 11.2 |
| 143 | Minimum | 155 |
| 199 | Maximum | 237 |
| 0.625 | Skewness | 0.439 |
| 0.660 | Kurtosis | 0.595 |
| 5.8% | Coefficient of variation | 6.0% |
| Percentiles | | |
| 145 | 1 st | 163 |
| 147 | 2 nd | 165 |
| 148 | 3 rd | 167 |
| 151 | 5 th | 169 |
| 153 | 10 th | 172 |
| 155 | 15 th | 175 |
| 156 | 20 th | 177 |
| 157 | 25 th | 179 |
| 158 | 30 th | 180 |
| 160 | 35 th | 181 |
| 161 | 40 th | 183 |
| 162 | 45 th | 184 |
| 163 | 50 th | 185 |
| 164 | 55 th | 187 |
| 165 | 60 th | 188 |
| 167 | 65 th | 189 |
| 168 | 70 th | 191 |
| 170 | 75 th | 193 |
| 171 | 80 th | 195 |
| 173 | 85 th | 197 |
| 176 | 90 th | 201 |
| 182 | 95 th | 205 |
| 186 | 97 th | 209 |
| 189 | 98 th | 211 |
| 193 | 99 th | 219 |

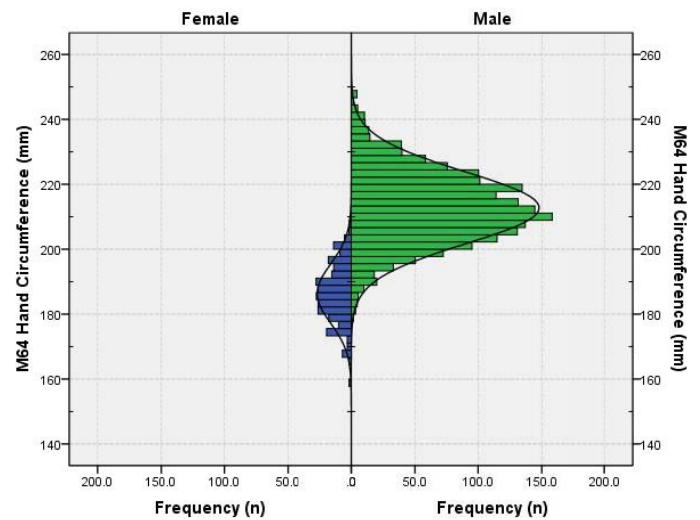
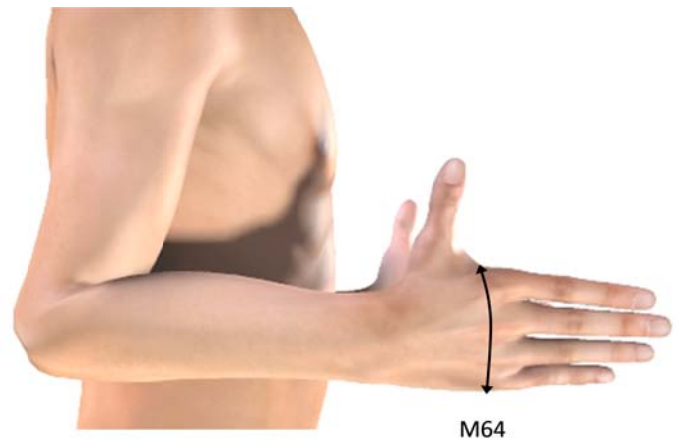


4.4.63 Hand Circumference (M64)

Posture: Anthropometric Standing.

Definition: The circumference around the hand that passes over the digitally-extracted Metacarpale II and Metacarpale V landmarks.

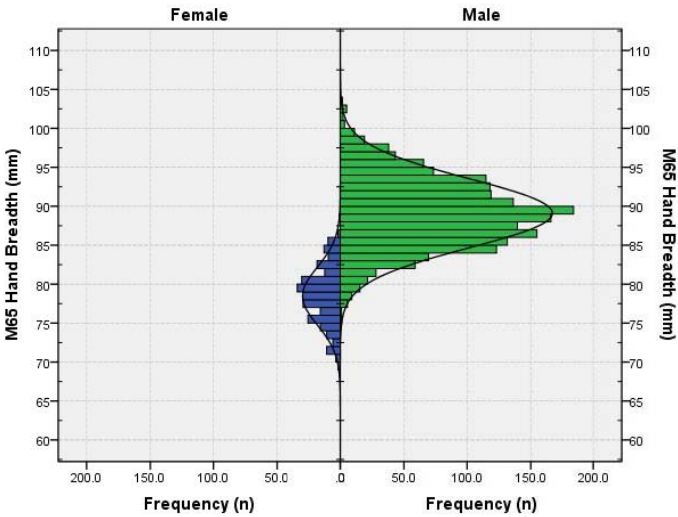
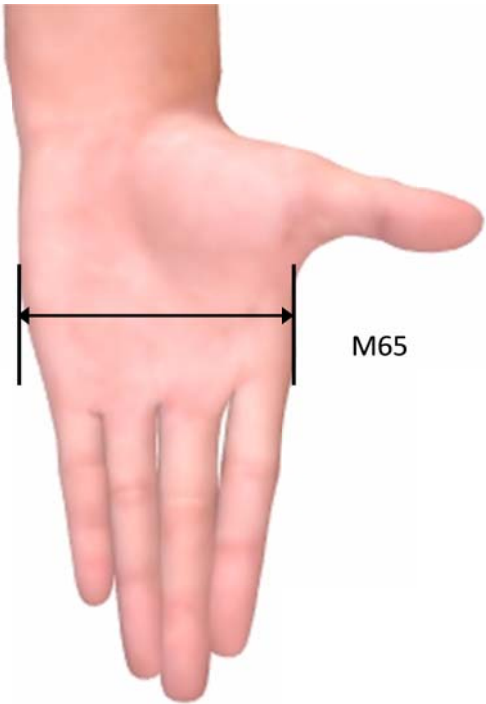
| FEMALES | | MALES |
|-------------|--------------------------|-------|
| 275 | n | 1855 |
| 186 | Mean | 213 |
| 0.5 | SE (mean) | 0.3 |
| 9.1 | SD | 11.1 |
| 159 | Minimum | 178 |
| 209 | Maximum | 249 |
| -0.086 | Skewness | 0.138 |
| -0.243 | Kurtosis | 0.032 |
| 4.9% | Coefficient of variation | 5.2% |
| Percentiles | | |
| 166 | 1 st | 187 |
| 168 | 2 nd | 191 |
| 168 | 3 rd | 192 |
| 171 | 5 th | 195 |
| 174 | 10 th | 199 |
| 177 | 15 th | 201 |
| 179 | 20 th | 203 |
| 180 | 25 th | 205 |
| 181 | 30 th | 207 |
| 183 | 35 th | 208 |
| 184 | 40 th | 209 |
| 185 | 45 th | 211 |
| 186 | 50 th | 212 |
| 188 | 55 th | 214 |
| 189 | 60 th | 215 |
| 189 | 65 th | 217 |
| 190 | 70 th | 219 |
| 193 | 75 th | 220 |
| 195 | 80 th | 222 |
| 197 | 85 th | 224 |
| 199 | 90 th | 227 |
| 201 | 95 th | 231 |
| 202 | 97 th | 234 |
| 204 | 98 th | 237 |
| 206 | 99 th | 240 |



4.4.64 Hand Breadth (M65)

Posture: Anthropometric Standing.
Definition: The point-to-point distance between the digitally-extracted Metacarpale II and Metacarpale V landmarks.

| FEMALES | | MALES |
|-------------|--------------------------|--------|
| 276 | n | 1860 |
| 78 | Mean | 89 |
| 0.2 | SE (mean) | 0.1 |
| 3.7 | SD | 4.4 |
| 70 | Minimum | 75 |
| 87 | Maximum | 104 |
| -0.051 | Skewness | 0.121 |
| -0.383 | Kurtosis | -0.140 |
| 4.7% | Coefficient of variation | 5.0% |
| Percentiles | | |
| 70 | 1 st | 79 |
| 71 | 2 nd | 80 |
| 71 | 3 rd | 81 |
| 72 | 5 th | 82 |
| 74 | 10 th | 84 |
| 74 | 15 th | 85 |
| 75 | 20 th | 85 |
| 76 | 25 th | 86 |
| 77 | 30 th | 87 |
| 77 | 35 th | 87 |
| 78 | 40 th | 88 |
| 78 | 45 th | 89 |
| 79 | 50 th | 89 |
| 79 | 55 th | 90 |
| 79 | 60 th | 90 |
| 80 | 65 th | 91 |
| 80 | 70 th | 92 |
| 81 | 75 th | 92 |
| 82 | 80 th | 93 |
| 83 | 85 th | 94 |
| 84 | 90 th | 95 |
| 85 | 95 th | 97 |
| 85 | 97 th | 98 |
| 86 | 98 th | 98 |
| 86 | 99 th | 99 |

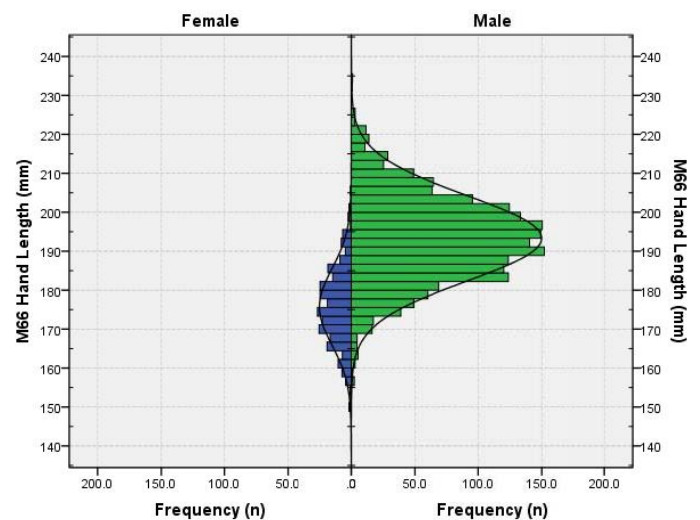
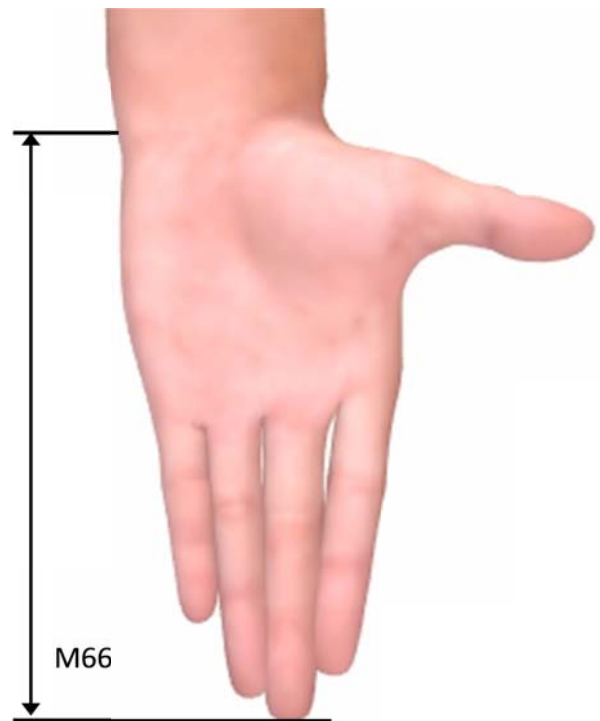


4.4.65 Hand Length (M66)

Posture: Anthropometric Standing.

Definition: The point-to-point distance between the digitally-extracted Centre Wrist Marker and Dactylion III landmarks.

| FEMALES | | MALES |
|-------------|--------------------------|-------|
| 276 | n | 1859 |
| 176 | Mean | 193 |
| 0.6 | SE (mean) | 0.3 |
| 9.8 | SD | 11.0 |
| 151 | Minimum | 157 |
| 206 | Maximum | 234 |
| 0.157 | Skewness | 0.051 |
| -0.098 | Kurtosis | 0.148 |
| 5.6% | Coefficient of variation | 5.7% |
| Percentiles | | |
| 153 | 1 st | 168 |
| 156 | 2 nd | 171 |
| 158 | 3 rd | 173 |
| 159 | 5 th | 176 |
| 163 | 10 th | 179 |
| 166 | 15 th | 182 |
| 167 | 20 th | 184 |
| 169 | 25 th | 186 |
| 170 | 30 th | 187 |
| 171 | 35 th | 189 |
| 173 | 40 th | 190 |
| 174 | 45 th | 192 |
| 175 | 50 th | 193 |
| 177 | 55 th | 195 |
| 178 | 60 th | 196 |
| 179 | 65 th | 197 |
| 181 | 70 th | 199 |
| 182 | 75 th | 201 |
| 184 | 80 th | 202 |
| 186 | 85 th | 204 |
| 189 | 90 th | 208 |
| 193 | 95 th | 212 |
| 195 | 97 th | 214 |
| 197 | 98 th | 217 |
| 201 | 99 th | 221 |



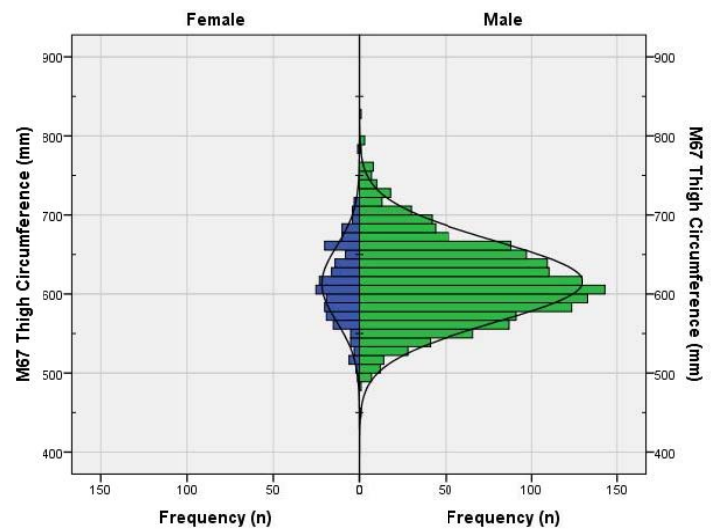
4.4.66 Thigh Circumference (M67)

Posture: Anthropometric Standing.

Definition: The maximum circumference of the thigh (measured perpendicular to the long axis of the leg) between the Trochanterion landmark and the Lateral Femoral Epicondyle, Standing landmark.



| FEMALES | | MALES |
|-------------|--------------------------|-------|
| 236 | n | 1519 |
| 612 | Mean | 615 |
| 3.1 | SE (mean) | 1.3 |
| 47.7 | SD | 51.2 |
| 490 | Minimum | 452 |
| 785 | Maximum | 827 |
| 0.094 | Skewness | 0.348 |
| -0.113 | Kurtosis | 0.308 |
| 7.8% | Coefficient of variation | 8.3% |
| Percentiles | | |
| 509 | 1 st | 507 |
| 515 | 2 nd | 520 |
| 519 | 3 rd | 526 |
| 532 | 5 th | 536 |
| 555 | 10 th | 553 |
| 564 | 15 th | 562 |
| 573 | 20 th | 572 |
| 580 | 25 th | 581 |
| 587 | 30 th | 587 |
| 593 | 35 th | 593 |
| 600 | 40 th | 601 |
| 606 | 45 th | 607 |
| 610 | 50 th | 614 |
| 615 | 55 th | 619 |
| 620 | 60 th | 626 |
| 629 | 65 th | 633 |
| 635 | 70 th | 640 |
| 650 | 75 th | 648 |
| 658 | 80 th | 656 |
| 666 | 85 th | 666 |
| 676 | 90 th | 684 |
| 695 | 95 th | 707 |
| 702 | 97 th | 724 |
| 704 | 98 th | 732 |
| 715 | 99 th | 750 |

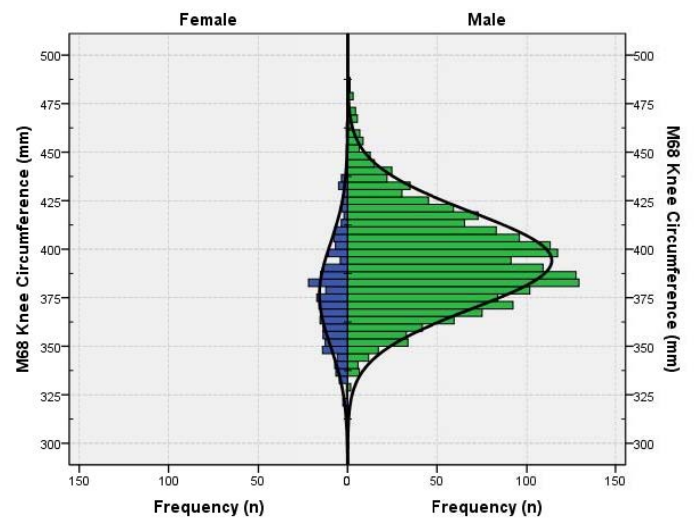
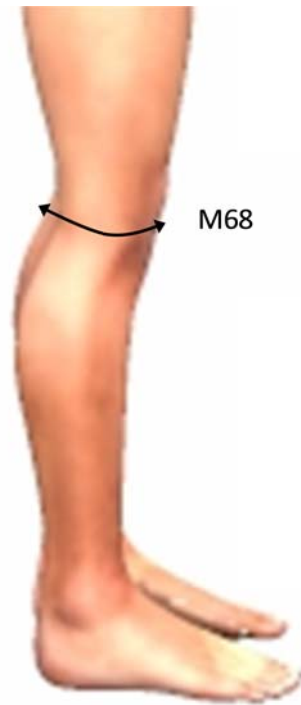


4.4.67 Knee Circumference (M68)

Posture: Anthropometric Standing.

Definition: The circumference of the knee at the height of the digitally-extracted Midpatella landmark.

| FEMALES | | MALES |
|-------------|--------------------------|-------|
| 273 | n | 1852 |
| 377 | Mean | 394 |
| 1.6 | SE (mean) | 0.6 |
| 26.7 | SD | 25.0 |
| 316 | Minimum | 318 |
| 462 | Maximum | 487 |
| 0.493 | Skewness | 0.418 |
| 0.130 | Kurtosis | 0.262 |
| 7.1% | Coefficient of variation | 6.3% |
| Percentiles | | |
| 322 | 1 st | 343 |
| 330 | 2 nd | 348 |
| 333 | 3 rd | 351 |
| 337 | 5 th | 356 |
| 346 | 10 th | 364 |
| 349 | 15 th | 368 |
| 354 | 20 th | 373 |
| 357 | 25 th | 377 |
| 361 | 30 th | 380 |
| 364 | 35 th | 383 |
| 367 | 40 th | 386 |
| 371 | 45 th | 389 |
| 374 | 50 th | 392 |
| 378 | 55 th | 396 |
| 381 | 60 th | 399 |
| 384 | 65 th | 402 |
| 387 | 70 th | 406 |
| 392 | 75 th | 410 |
| 397 | 80 th | 414 |
| 405 | 85 th | 420 |
| 412 | 90 th | 426 |
| 429 | 95 th | 438 |
| 434 | 97 th | 446 |
| 438 | 98 th | 452 |
| 449 | 99 th | 462 |

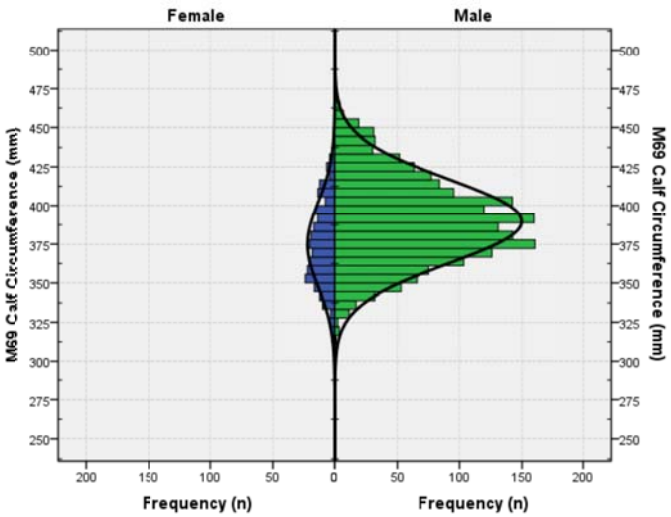


4.4.68 Calf Circumference (M69)

Posture: Anthropometric Standing.

Definition: The maximum horizontal circumference of the lower leg segment.

| FEMALES | | MALES |
|-------------|--------------------------|--------|
| 271 | n | 1844 |
| 375 | Mean | 390 |
| 1.7 | SE (mean) | 0.6 |
| 27.6 | SD | 27.3 |
| 309 | Minimum | 299 |
| 463 | Maximum | 479 |
| 0.346 | Skewness | 0.210 |
| -0.237 | Kurtosis | -0.226 |
| 7.4% | Coefficient of variation | 7.0% |
| Percentiles | | |
| 320 | 1 st | 333 |
| 324 | 2 nd | 339 |
| 328 | 3 rd | 342 |
| 336 | 5 th | 347 |
| 341 | 10 th | 355 |
| 346 | 15 th | 362 |
| 351 | 20 th | 367 |
| 355 | 25 th | 371 |
| 357 | 30 th | 375 |
| 361 | 35 th | 378 |
| 365 | 40 th | 381 |
| 369 | 45 th | 385 |
| 373 | 50 th | 389 |
| 376 | 55 th | 392 |
| 380 | 60 th | 395 |
| 384 | 65 th | 400 |
| 389 | 70 th | 403 |
| 394 | 75 th | 407 |
| 399 | 80 th | 413 |
| 409 | 85 th | 419 |
| 413 | 90 th | 427 |
| 423 | 95 th | 439 |
| 427 | 97 th | 445 |
| 430 | 98 th | 447 |
| 449 | 99 th | 454 |

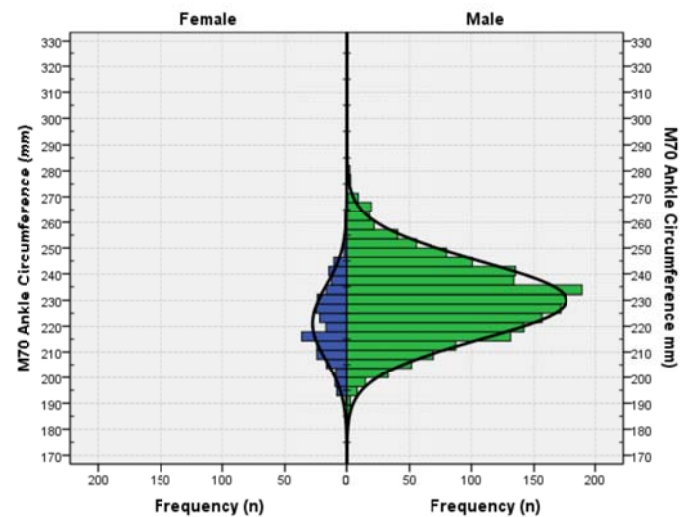


4.4.69 Ankle Circumference (M70)

Posture: Anthropometric Standing.

Definition: The minimum horizontal circumference above the digitally-extracted Lateral Malleolus landmark and below the level of the Maximum Calf Circumference.

| FEMALES | | MALES |
|-------------|--------------------------|-------|
| 276 | n | 1858 |
| 221 | Mean | 230 |
| 0.9 | SE (mean) | 0.3 |
| 14.4 | SD | 15.0 |
| 185 | Minimum | 175 |
| 265 | Maximum | 301 |
| 0.250 | Skewness | 0.216 |
| -0.225 | Kurtosis | 0.235 |
| 6.5% | Coefficient of variation | 6.5% |
| Percentiles | | |
| 193 | 1 st | 198 |
| 195 | 2 nd | 201 |
| 196 | 3 rd | 203 |
| 198 | 5 th | 206 |
| 203 | 10 th | 211 |
| 206 | 15 th | 215 |
| 209 | 20 th | 217 |
| 211 | 25 th | 219 |
| 213 | 30 th | 222 |
| 215 | 35 th | 224 |
| 216 | 40 th | 226 |
| 218 | 45 th | 228 |
| 219 | 50 th | 230 |
| 222 | 55 th | 232 |
| 225 | 60 th | 233 |
| 227 | 65 th | 235 |
| 229 | 70 th | 237 |
| 231 | 75 th | 240 |
| 233 | 80 th | 242 |
| 237 | 85 th | 246 |
| 241 | 90 th | 249 |
| 246 | 95 th | 255 |
| 248 | 97 th | 260 |
| 251 | 98 th | 264 |
| 261 | 99 th | 267 |



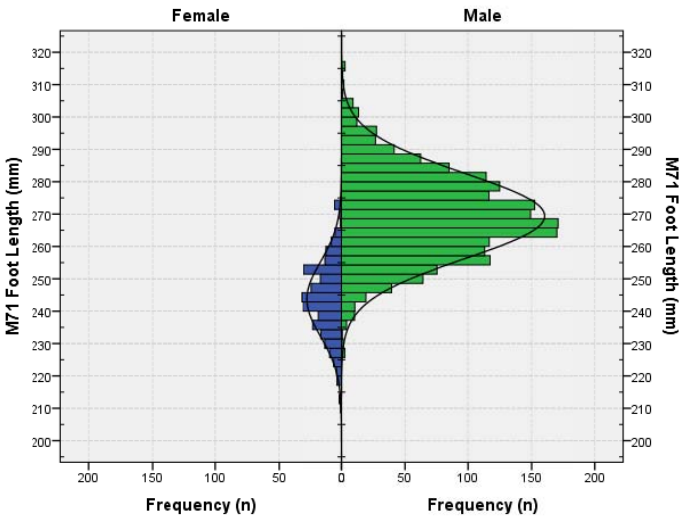
4.4.70 Foot Length (M71)

Posture: Anthropometric Standing.

Definition: The point-to-point distance between the digitally-extracted Acropodion and Pternion landmarks.



| FEMALES | | MALES |
|-------------|--------------------------|-------|
| 275 | n | 1857 |
| 244 | Mean | 269 |
| 0.7 | SE (mean) | 0.3 |
| 11.5 | SD | 13.2 |
| 210 | Minimum | 227 |
| 274 | Maximum | 316 |
| 0.023 | Skewness | 0.177 |
| 0.077 | Kurtosis | 0.078 |
| 4.7% | Coefficient of variation | 4.9% |
| Percentiles | | |
| 215 | 1 st | 240 |
| 220 | 2 nd | 244 |
| 221 | 3 rd | 246 |
| 224 | 5 th | 249 |
| 229 | 10 th | 253 |
| 232 | 15 th | 255 |
| 234 | 20 th | 258 |
| 236 | 25 th | 260 |
| 238 | 30 th | 263 |
| 240 | 35 th | 264 |
| 241 | 40 th | 266 |
| 242 | 45 th | 267 |
| 244 | 50 th | 269 |
| 245 | 55 th | 271 |
| 246 | 60 th | 272 |
| 248 | 65 th | 274 |
| 250 | 70 th | 276 |
| 252 | 75 th | 279 |
| 253 | 80 th | 281 |
| 255 | 85 th | 283 |
| 258 | 90 th | 286 |
| 263 | 95 th | 292 |
| 266 | 97 th | 296 |
| 272 | 98 th | 298 |
| 273 | 99 th | 302 |

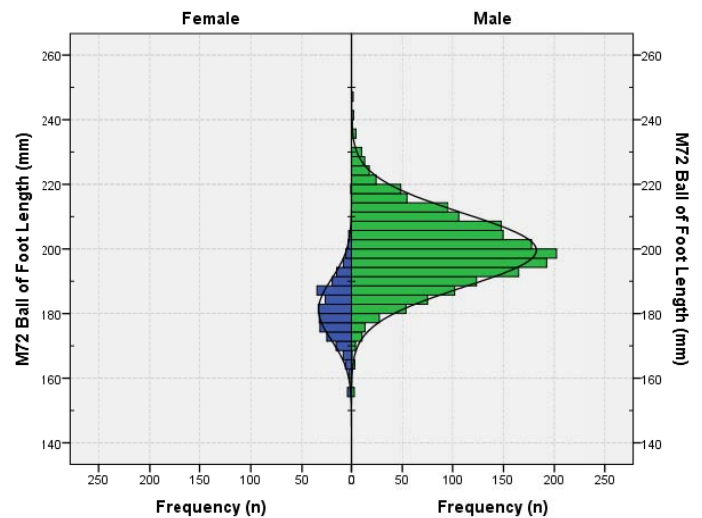
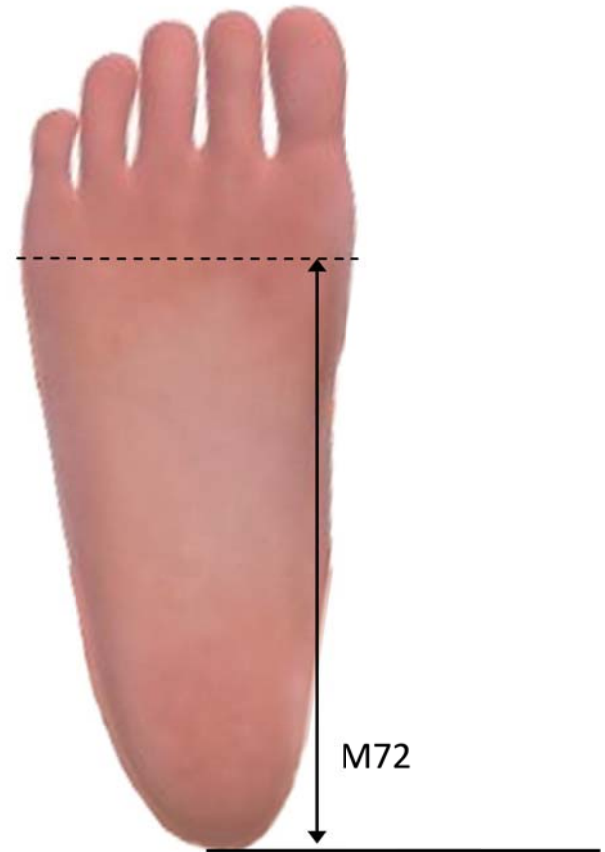


4.4.71 Ball of Foot Length (M72)

Posture: Anthropometric Standing.

Definition: The distance along a line between Acropodion and Pternion, between the Pternion and intersection of a line drawn through the First Metatarsophalangeal Joint Protrusion Landmark perpendicular to the line between Acropodion and Pternion.

| FEMALES | | MALES |
|-------------|--------------------------|-------|
| 269 | n | 1828 |
| 181 | Mean | 200 |
| 0.6 | SE (mean) | 0.3 |
| 9.5 | SD | 11.4 |
| 154 | Minimum | 156 |
| 218 | Maximum | 247 |
| 0.083 | Skewness | 0.171 |
| 0.469 | Kurtosis | 0.624 |
| 5.3% | Coefficient of variation | 5.7% |
| Percentiles | | |
| 157 | 1 st | 173 |
| 160 | 2 nd | 178 |
| 164 | 3 rd | 179 |
| 166 | 5 th | 182 |
| 170 | 10 th | 185 |
| 172 | 15 th | 188 |
| 173 | 20 th | 190 |
| 175 | 25 th | 192 |
| 176 | 30 th | 194 |
| 177 | 35 th | 195 |
| 178 | 40 th | 197 |
| 180 | 45 th | 198 |
| 181 | 50 th | 199 |
| 182 | 55 th | 200 |
| 184 | 60 th | 202 |
| 185 | 65 th | 203 |
| 187 | 70 th | 205 |
| 188 | 75 th | 207 |
| 189 | 80 th | 209 |
| 191 | 85 th | 211 |
| 193 | 90 th | 214 |
| 197 | 95 th | 219 |
| 199 | 97 th | 222 |
| 202 | 98 th | 224 |
| 205 | 99 th | 230 |

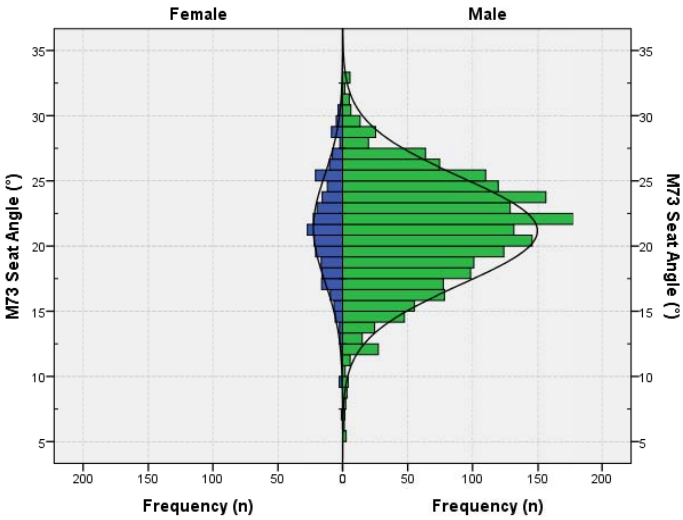


4.4.72 Seat Angle (M73)

Posture: Anthropometric Standing.

Definition: A two dimensional angle in the anterior-posterior plane, defined by a vertical line and a line between the Buttock Point, Posterior landmark and the Waist Preferred, Posterior landmark.

| FEMALES | | MALES |
|-------------|--------------------------|--------|
| 276 | n | 1858 |
| 21 | Mean | 21 |
| 0.2 | SE (mean) | 0.1 |
| 4.1 | SD | 4.1 |
| 7 | Minimum | 6 |
| 31 | Maximum | 33 |
| -0.160 | Skewness | -0.334 |
| 0.275 | Kurtosis | 0.318 |
| 19.2% | Coefficient of variation | 19.5% |
| Percentiles | | |
| 10 | 1 st | 11 |
| 13 | 2 nd | 12 |
| 14 | 3 rd | 13 |
| 15 | 5 th | 14 |
| 17 | 10 th | 16 |
| 17 | 15 th | 17 |
| 18 | 20 th | 18 |
| 19 | 25 th | 19 |
| 19 | 30 th | 19 |
| 20 | 35 th | 20 |
| 20 | 40 th | 20 |
| 21 | 45 th | 21 |
| 21 | 50 th | 22 |
| 22 | 55 th | 22 |
| 22 | 60 th | 22 |
| 23 | 65 th | 23 |
| 23 | 70 th | 24 |
| 24 | 75 th | 24 |
| 25 | 80 th | 25 |
| 26 | 85 th | 25 |
| 27 | 90 th | 26 |
| 29 | 95 th | 27 |
| 29 | 97 th | 28 |
| 30 | 98 th | 29 |
| 30 | 99 th | 30 |

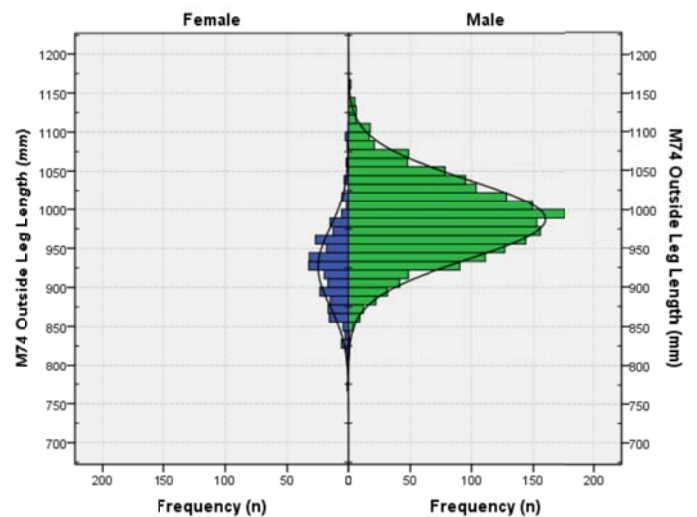
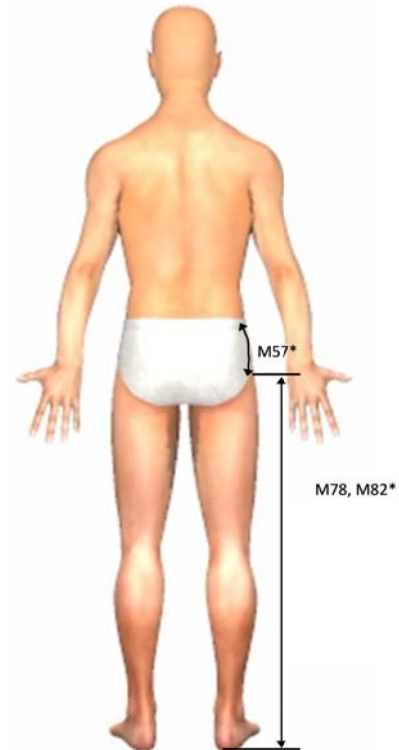


4.4.73 Outside Leg Length (M74)

Posture: Anthropometric Standing.

Definition: The sum of the Waist-Hip Distance (M57) and Hip Level (M78, M82).

| FEMALES | | MALES |
|-------------|--------------------------|-------|
| 276 | n | 1854 |
| 926 | Mean | 987 |
| 3.0 | SE (mean) | 1.2 |
| 50.2 | SD | 51.4 |
| 774 | Minimum | 816 |
| 1098 | Maximum | 1164 |
| 0.321 | Skewness | 0.122 |
| 0.959 | Kurtosis | 0.075 |
| 5.4% | Coefficient of variation | 5.2% |
| Percentiles | | |
| 812 | 1 st | 869 |
| 825 | 2 nd | 881 |
| 831 | 3 rd | 893 |
| 846 | 5 th | 903 |
| 863 | 10 th | 925 |
| 874 | 15 th | 936 |
| 885 | 20 th | 944 |
| 892 | 25 th | 952 |
| 897 | 30 th | 959 |
| 907 | 35 th | 967 |
| 914 | 40 th | 974 |
| 923 | 45 th | 980 |
| 929 | 50 th | 986 |
| 933 | 55 th | 993 |
| 937 | 60 th | 999 |
| 943 | 65 th | 1005 |
| 950 | 70 th | 1013 |
| 957 | 75 th | 1022 |
| 963 | 80 th | 1030 |
| 970 | 85 th | 1041 |
| 982 | 90 th | 1053 |
| 1012 | 95 th | 1074 |
| 1034 | 97 th | 1088 |
| 1051 | 98 th | 1101 |
| 1093 | 99 th | 1117 |

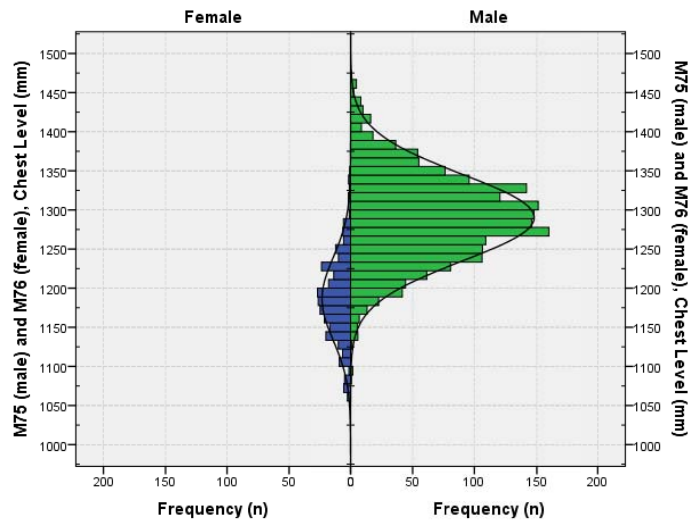


4.4.74 Chest and Bust Level (M75, M76)

Posture: Anthropometric Standing.

Definition: The vertical distance between the standing surface and the digitally-extracted Thelion, Right landmark (males) or the digitally-extracted Bustpoint, Right landmark (females).

| FEMALES | | MALES |
|-------------|--------------------------|-------|
| 276 | n | 1860 |
| 1186 | Mean | 1290 |
| 3.2 | SE (mean) | 1.3 |
| 53.3 | SD | 55.8 |
| 1057 | Minimum | 1082 |
| 1351 | Maximum | 1477 |
| 0.168 | Skewness | 0.059 |
| 0.183 | Kurtosis | 0.166 |
| 4.5% | Coefficient of variation | 4.3% |
| Percentiles | | |
| 1067 | 1 st | 1163 |
| 1070 | 2 nd | 1179 |
| 1080 | 3 rd | 1187 |
| 1096 | 5 th | 1199 |
| 1120 | 10 th | 1219 |
| 1134 | 15 th | 1232 |
| 1143 | 20 th | 1242 |
| 1153 | 25 th | 1253 |
| 1157 | 30 th | 1261 |
| 1166 | 35 th | 1269 |
| 1172 | 40 th | 1276 |
| 1180 | 45 th | 1283 |
| 1185 | 50 th | 1290 |
| 1190 | 55 th | 1297 |
| 1197 | 60 th | 1304 |
| 1203 | 65 th | 1311 |
| 1212 | 70 th | 1320 |
| 1223 | 75 th | 1327 |
| 1230 | 80 th | 1335 |
| 1241 | 85 th | 1346 |
| 1253 | 90 th | 1361 |
| 1277 | 95 th | 1381 |
| 1291 | 97 th | 1397 |
| 1310 | 98 th | 1414 |
| 1333 | 99 th | 1429 |

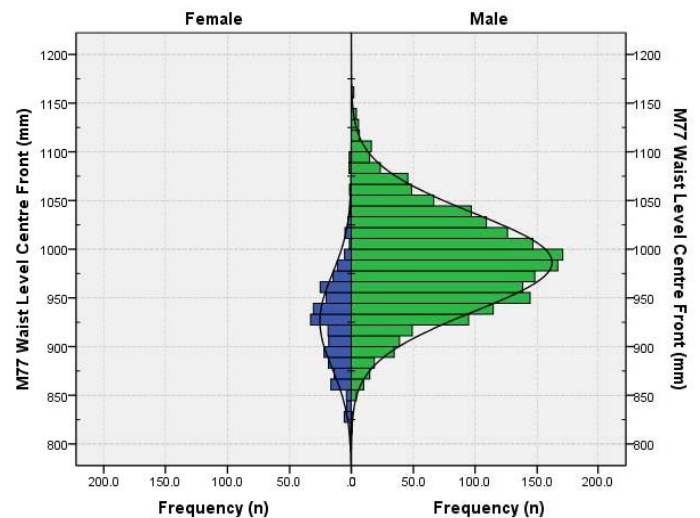
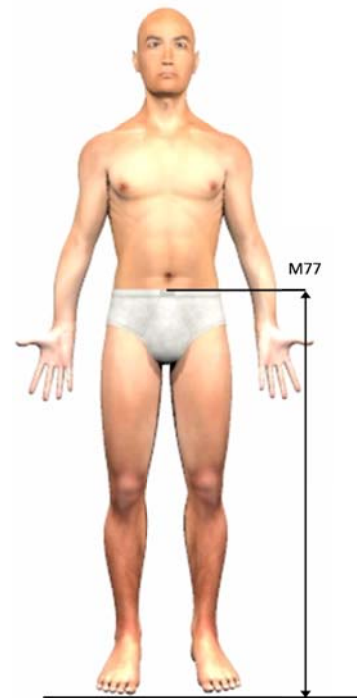


4.4.75 Waist Level Centre Front (M77)

Posture: Anthropometric Standing.

Definition: The vertical distance between the standing surface and the digitally-extracted Waist Preferred, Anterior landmark.

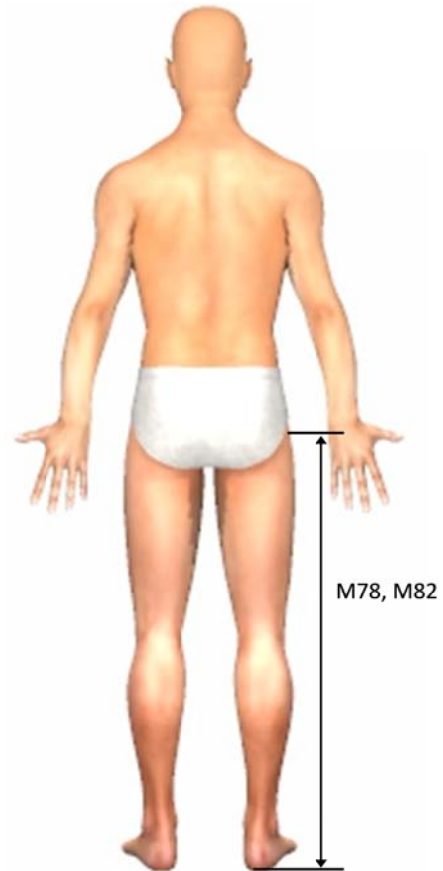
| FEMALES | | MALES |
|-------------|--------------------------|-------|
| 276 | n | 1861 |
| 926 | Mean | 987 |
| 2.9 | SE (mean) | 1.2 |
| 48.6 | SD | 50.9 |
| 807 | Minimum | 815 |
| 1097 | Maximum | 1163 |
| 0.422 | Skewness | 0.133 |
| 0.838 | Kurtosis | 0.091 |
| 5.3% | Coefficient of variation | 5.2% |
| Percentiles | | |
| 823 | 1 st | 869 |
| 828 | 2 nd | 881 |
| 839 | 3 rd | 894 |
| 851 | 5 th | 903 |
| 864 | 10 th | 925 |
| 874 | 15 th | 935 |
| 884 | 20 th | 944 |
| 891 | 25 th | 951 |
| 896 | 30 th | 958 |
| 907 | 35 th | 966 |
| 914 | 40 th | 973 |
| 923 | 45 th | 980 |
| 928 | 50 th | 985 |
| 933 | 55 th | 992 |
| 937 | 60 th | 998 |
| 943 | 65 th | 1004 |
| 950 | 70 th | 1012 |
| 957 | 75 th | 1020 |
| 962 | 80 th | 1029 |
| 969 | 85 th | 1040 |
| 981 | 90 th | 1050 |
| 1013 | 95 th | 1073 |
| 1032 | 97 th | 1087 |
| 1042 | 98 th | 1099 |
| 1087 | 99 th | 1115 |



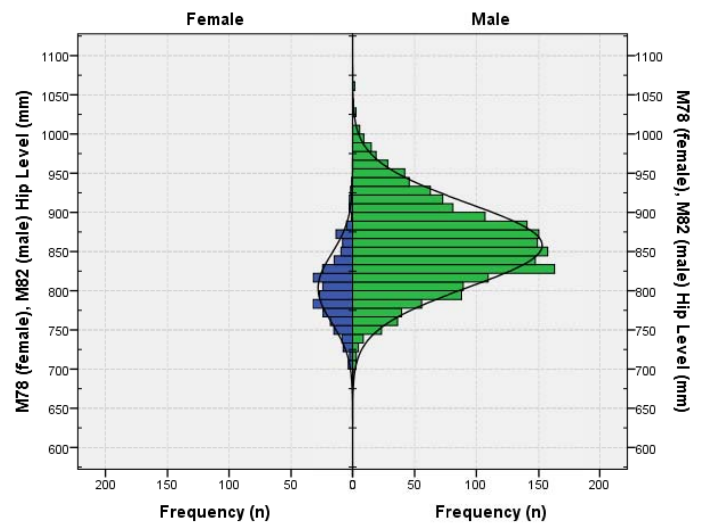
4.4.76 Hip Level, Male and Female (M78, M82)

Posture: Anthropometric Standing.

Definition: The vertical distance between the standing surface and the digitally-extracted Hip Marker landmark (male) and the vertical distance between the standing surface and the level at which the Maximum Hip Circumference measurement is established (female).



| FEMALES | | MALES |
|-------------|--------------------------|-------|
| 276 | n | 1861 |
| 803 | Mean | 858 |
| 2.7 | SE (mean) | 1.3 |
| 44.1 | SD | 54.0 |
| 704 | Minimum | 697 |
| 934 | Maximum | 1059 |
| 0.373 | Skewness | 0.221 |
| 0.138 | Kurtosis | 0.037 |
| 5.5% | Coefficient of variation | 6.3% |
| Percentiles | | |
| 707 | 1 st | 743 |
| 717 | 2 nd | 755 |
| 726 | 3 rd | 759 |
| 734 | 5 th | 772 |
| 748 | 10 th | 791 |
| 757 | 15 th | 802 |
| 767 | 20 th | 813 |
| 773 | 25 th | 822 |
| 779 | 30 th | 829 |
| 784 | 35 th | 835 |
| 788 | 40 th | 842 |
| 797 | 45 th | 849 |
| 801 | 50 th | 856 |
| 806 | 55 th | 863 |
| 813 | 60 th | 870 |
| 818 | 65 th | 876 |
| 823 | 70 th | 883 |
| 829 | 75 th | 892 |
| 837 | 80 th | 901 |
| 846 | 85 th | 916 |
| 865 | 90 th | 930 |
| 880 | 95 th | 951 |
| 895 | 97 th | 966 |
| 914 | 98 th | 975 |
| 926 | 99 th | 990 |

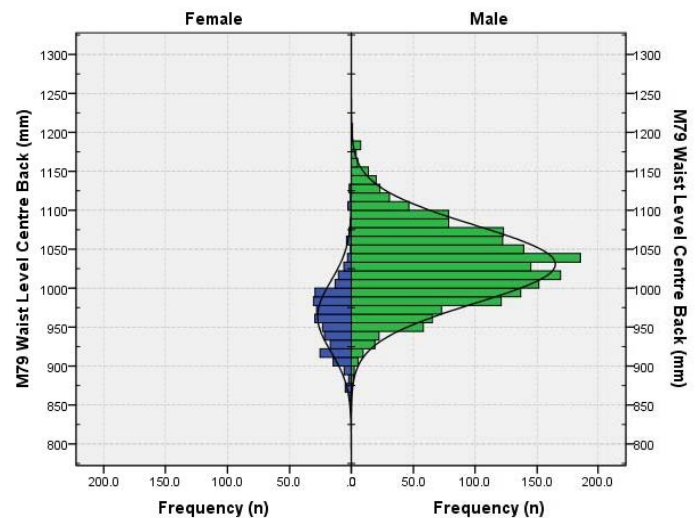
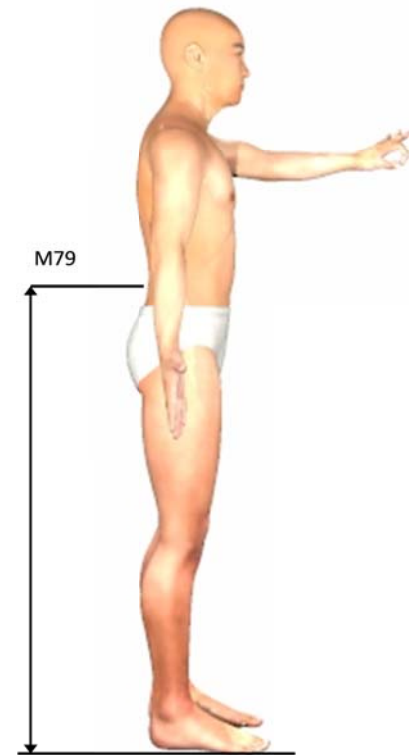


4.4.77 Waist Level Centre Back (M79)

Posture: Anthropometric Standing.

Definition: The vertical distance between the standing surface and the digitally-extracted Waist Preferred, Posterior landmark.

| FEMALES | | MALES |
|-------------|--------------------------|-------|
| 276 | n | 1861 |
| 964 | Mean | 1031 |
| 2.7 | SE (mean) | 1.2 |
| 45.2 | SD | 50.1 |
| 852 | Minimum | 874 |
| 1129 | Maximum | 1210 |
| 0.637 | Skewness | 0.196 |
| 1.439 | Kurtosis | 0.094 |
| 4.7% | Coefficient of variation | 4.9% |
| Percentiles | | |
| 868 | 1 st | 918 |
| 872 | 2 nd | 931 |
| 882 | 3 rd | 942 |
| 899 | 5 th | 949 |
| 908 | 10 th | 967 |
| 917 | 15 th | 980 |
| 924 | 20 th | 988 |
| 933 | 25 th | 996 |
| 939 | 30 th | 1003 |
| 946 | 35 th | 1010 |
| 953 | 40 th | 1017 |
| 959 | 45 th | 1022 |
| 964 | 50 th | 1029 |
| 968 | 55 th | 1036 |
| 974 | 60 th | 1042 |
| 979 | 65 th | 1047 |
| 983 | 70 th | 1056 |
| 990 | 75 th | 1064 |
| 996 | 80 th | 1073 |
| 1001 | 85 th | 1082 |
| 1012 | 90 th | 1095 |
| 1040 | 95 th | 1115 |
| 1067 | 97 th | 1130 |
| 1098 | 98 th | 1142 |
| 1118 | 99 th | 1157 |

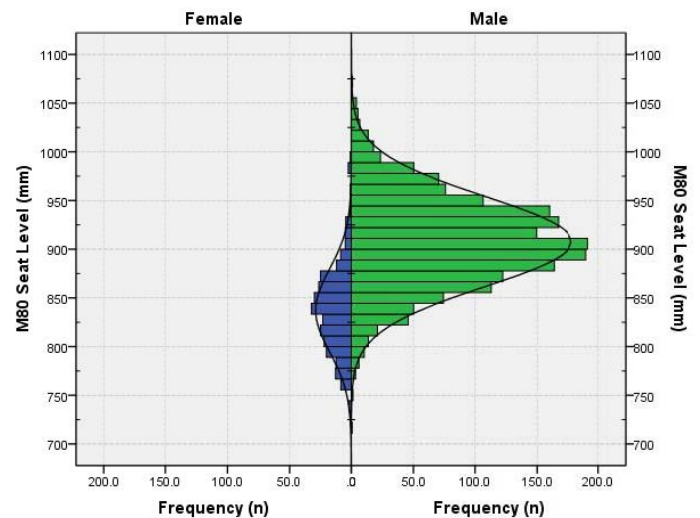
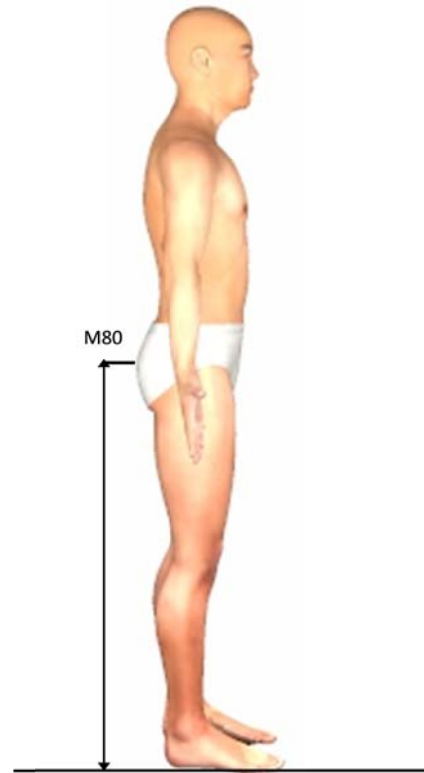


4.4.78 Seat Level (M80)

Posture: Anthropometric Standing.

Definition: The vertical distance between the standing surface and the digitally-extracted Buttock Point, Posterior landmark.

| FEMALES | | MALES |
|-------------|--------------------------|-------|
| 276 | n | 1861 |
| 837 | Mean | 908 |
| 2.6 | SE (mean) | 1.1 |
| 42.8 | SD | 46.4 |
| 731 | Minimum | 720 |
| 998 | Maximum | 1077 |
| 0.421 | Skewness | 0.040 |
| 0.740 | Kurtosis | 0.267 |
| 5.1% | Coefficient of variation | 5.1% |
| Percentiles | | |
| 744 | 1 st | 796 |
| 760 | 2 nd | 812 |
| 762 | 3 rd | 822 |
| 770 | 5 th | 831 |
| 783 | 10 th | 850 |
| 793 | 15 th | 861 |
| 800 | 20 th | 870 |
| 805 | 25 th | 878 |
| 813 | 30 th | 885 |
| 820 | 35 th | 890 |
| 827 | 40 th | 896 |
| 833 | 45 th | 901 |
| 838 | 50 th | 907 |
| 842 | 55 th | 913 |
| 847 | 60 th | 920 |
| 852 | 65 th | 926 |
| 857 | 70 th | 932 |
| 865 | 75 th | 938 |
| 871 | 80 th | 945 |
| 876 | 85 th | 954 |
| 889 | 90 th | 968 |
| 913 | 95 th | 984 |
| 923 | 97 th | 995 |
| 933 | 98 th | 1009 |
| 980 | 99 th | 1022 |

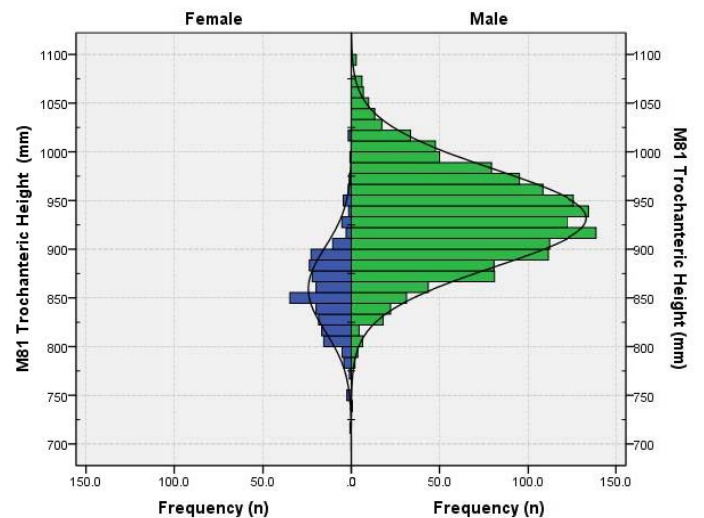
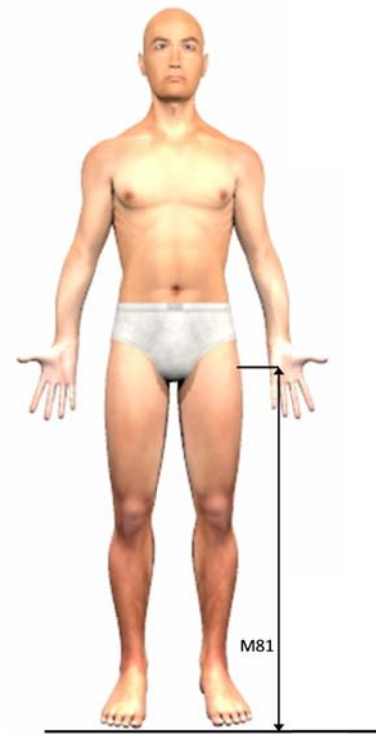


4.4.79 Trochanteric Height (M81)

Posture: Anthropometric Standing.

Definition: The vertical distance between the standing surface and the digitally extracted Trochanterion landmark.

| FEMALES | | MALES |
|-------------|--------------------------|-------|
| 236 | n | 1508 |
| 859 | Mean | 932 |
| 2.8 | SE (mean) | 1.3 |
| 43.4 | SD | 50.1 |
| 722 | Minimum | 743 |
| 1021 | Maximum | 1096 |
| 0.387 | Skewness | 0.093 |
| 1.259 | Kurtosis | 0.092 |
| 5.0% | Coefficient of variation | 5.4% |
| Percentiles | | |
| 745 | 1 st | 817 |
| 775 | 2 nd | 828 |
| 780 | 3 rd | 840 |
| 798 | 5 th | 852 |
| 808 | 10 th | 869 |
| 814 | 15 th | 881 |
| 823 | 20 th | 890 |
| 829 | 25 th | 897 |
| 838 | 30 th | 905 |
| 844 | 35 th | 912 |
| 849 | 40 th | 919 |
| 852 | 45 th | 925 |
| 855 | 50 th | 931 |
| 861 | 55 th | 938 |
| 871 | 60 th | 944 |
| 876 | 65 th | 951 |
| 879 | 70 th | 958 |
| 885 | 75 th | 965 |
| 891 | 80 th | 973 |
| 898 | 85 th | 983 |
| 910 | 90 th | 997 |
| 934 | 95 th | 1016 |
| 951 | 97 th | 1032 |
| 960 | 98 th | 1041 |
| 1005 | 99 th | 1056 |

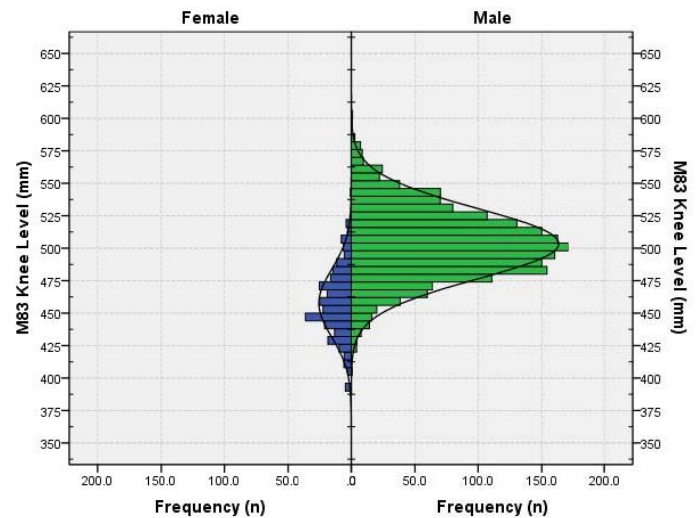
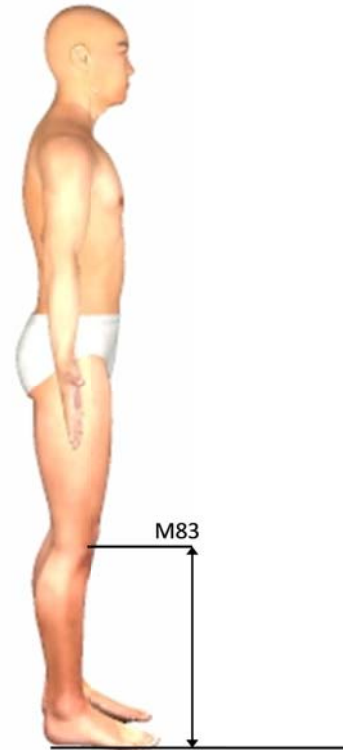


4.4.80 Knee Level (M83)

Posture: Anthropometric Standing.

Definition: The vertical distance between the standing surface and the digitally-extracted Midpatella landmark.

| FEMALES | | MALES |
|-------------|--------------------------|-------|
| 276 | n | 1861 |
| 458 | Mean | 503 |
| 1.6 | SE (mean) | 0.6 |
| 26.0 | SD | 27.3 |
| 392 | Minimum | 404 |
| 540 | Maximum | 601 |
| 0.161 | Skewness | 0.123 |
| 0.054 | Kurtosis | 0.181 |
| 5.7% | Coefficient of variation | 5.4% |
| Percentiles | | |
| 394 | 1 st | 439 |
| 405 | 2 nd | 446 |
| 410 | 3 rd | 454 |
| 415 | 5 th | 461 |
| 426 | 10 th | 470 |
| 430 | 15 th | 477 |
| 437 | 20 th | 481 |
| 442 | 25 th | 485 |
| 444 | 30 th | 489 |
| 447 | 35 th | 492 |
| 450 | 40 th | 496 |
| 452 | 45 th | 499 |
| 456 | 50 th | 503 |
| 459 | 55 th | 506 |
| 462 | 60 th | 509 |
| 467 | 65 th | 513 |
| 472 | 70 th | 517 |
| 474 | 75 th | 521 |
| 478 | 80 th | 526 |
| 483 | 85 th | 532 |
| 492 | 90 th | 540 |
| 506 | 95 th | 549 |
| 510 | 97 th | 558 |
| 515 | 98 th | 563 |
| 520 | 99 th | 574 |

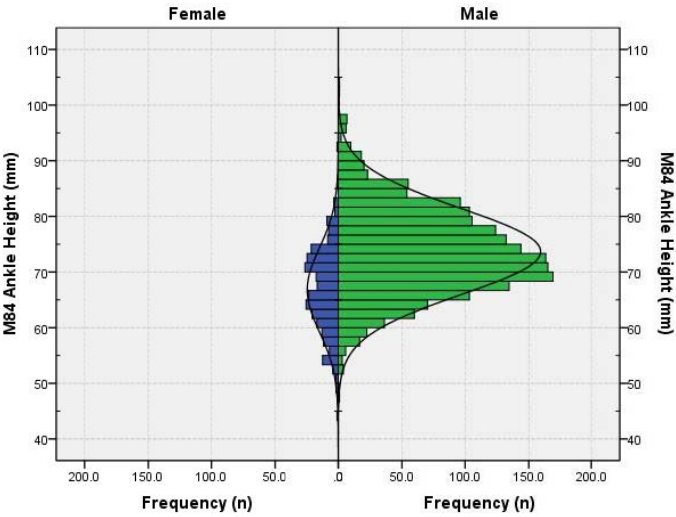


4.4.81 Ankle Height (M84)

Posture: Anthropometric Standing.

Definition: The vertical distance between the standing surface and the digitally-extracted Lateral Malleolus landmark.

| FEMALES | | MALES |
|-------------|--------------------------|-------|
| 276 | n | 1859 |
| 67 | Mean | 74 |
| 0.5 | SE (mean) | 0.2 |
| 7.5 | SD | 7.8 |
| 45 | Minimum | 48 |
| 92 | Maximum | 104 |
| -0.017 | Skewness | 0.282 |
| -0.058 | Kurtosis | 0.177 |
| 11.3% | Coefficient of variation | 10.5% |
| Percentiles | | |
| 50 | 1 st | 57 |
| 52 | 2 nd | 59 |
| 53 | 3 rd | 60 |
| 54 | 5 th | 62 |
| 57 | 10 th | 64 |
| 59 | 15 th | 66 |
| 60 | 20 th | 67 |
| 62 | 25 th | 68 |
| 63 | 30 th | 69 |
| 64 | 35 th | 70 |
| 65 | 40 th | 71 |
| 66 | 45 th | 72 |
| 67 | 50 th | 73 |
| 68 | 55 th | 74 |
| 69 | 60 th | 75 |
| 70 | 65 th | 76 |
| 71 | 70 th | 78 |
| 72 | 75 th | 79 |
| 73 | 80 th | 81 |
| 75 | 85 th | 82 |
| 76 | 90 th | 84 |
| 79 | 95 th | 87 |
| 81 | 97 th | 89 |
| 82 | 98 th | 91 |
| 83 | 99 th | 93 |

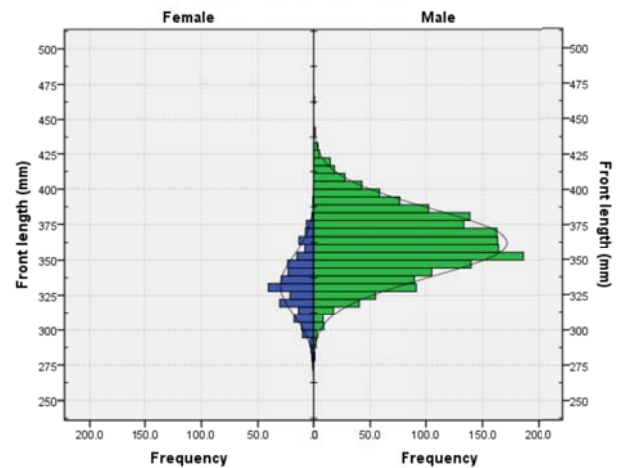
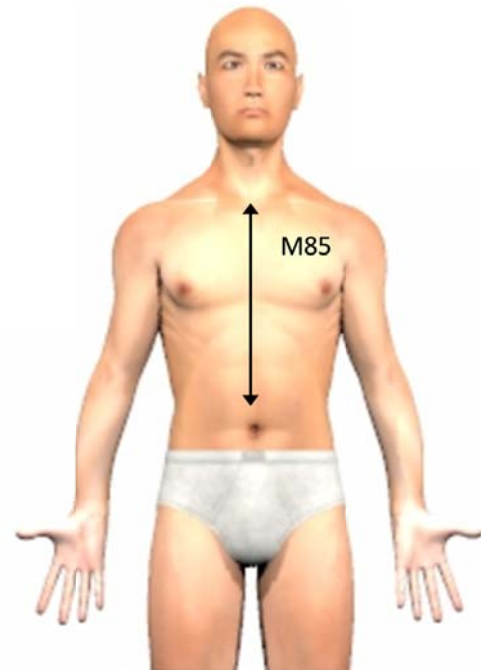


4.4.82 Front Length (M85)

Posture: Anthropometric Standing.

Definition: M04 Suprasternale Height minus
M07 Iliocristale Height.

| FEMALES | | MALES |
|---------|--------------------------|--------|
| 277 | n | 1861 |
| 362 | Mean | 332 |
| 0.6 | SE (mean) | 1.2 |
| 24.0 | SD | 20.8 |
| 281 | Minimum | 277 |
| 467 | Maximum | 393 |
| 0.091 | Skewness | 0.041 |
| -0.011 | Kurtosis | -0.161 |
| | Coefficient of variation | |
| | Percentiles | |
| 282 | 1 st | 309 |
| 289 | 2 nd | 315 |
| 294 | 3 rd | 319 |
| 297 | 5 th | 323 |
| 305 | 10 th | 331 |
| 310 | 15 th | 337 |
| 315 | 20 th | 342 |
| 319 | 25 th | 346 |
| 322 | 30 th | 350 |
| 325 | 35 th | 353 |
| 328 | 40 th | 356 |
| 330 | 45 th | 359 |
| 332 | 50 th | 362 |
| 334 | 55 th | 365 |
| 336 | 60 th | 368 |
| 339 | 65 th | 371 |
| 342 | 70 th | 375 |
| 346 | 75 th | 379 |
| 349 | 80 th | 383 |
| 354 | 85 th | 387 |
| 362 | 90 th | 393 |
| 368 | 95 th | 403 |
| 374 | 97 th | 409 |
| 375 | 98 th | 413 |
| 377 | 99 th | 419 |



5. Multivariate Statistics

5.1 Introduction

Boundary manikins have been produced through factor analysis of the univariate data provided at Section 4. The factor analyses performed used the dimensions considered critical to land vehicle design and the design of vehicles in which Army personnel may be transported. These dimensions were used to define the underlying critical human body size factors. Manikins that demonstrate the extremes of these factors can then be used to validate a design in terms of the central 90% of the population, as defined by MIL-STD 1472G [2012].

The boundary manikins provided within this standard are based on measurements considered critical for land vehicle design/assessment and the majority level of accommodation (central 90%). As such, these boundary manikins may be inappropriate for other applications and different levels of required accommodation, for example dismounted equipment design/assessment and the requirement for the full level of accommodation. Should boundary manikins be required for other applications or levels of accommodation then DSTO Land Division, Land Human Systems Branch should be contacted for advice.

The boundary manikins presented in this standard represent the majority level of accommodation for the AWAS dataset. The following boundary manikins are provided:

- Manikin A:* Overall smallest female
- Manikin B:* Widest male
- Manikin C:* Largest upper body size:lower body size male
- Manikin D:* Smallest upper body size:lower body size male
- Manikin E:* Overall largest male
- Manikin F:* Overall smallest male
- Manikin G:* Average male

5.2 Multivariate Assessment Procedure

The multivariate assessment procedure, shown in Figure 8, is intended to be used in combination with univariate assessments to support military land vehicle design and evaluation. As the univariate assessment procedure is quicker to apply than the multivariate assessment procedure, univariate assessments should be performed first to provide initial assessments of the vehicle in terms of single anthropometric dimensions, for example to identify any occupant fit issues. The multivariate assessment procedure should then be applied to assess aspects that are related to multiple anthropometric dimensions, for example reach to controls.

The multivariate assessment procedure is intended to be used for assessment where more than one anthropometric dimension is considered key and the dimensions are related to each other in the assessment. For example, multiple anthropometric variables will need to be considered when assessing reach in military land vehicles, given that both the height of the shoulder and the length of the arm will be influential on the reach envelope. It should be noted that there are some instances where more than one dimension is considered key, however, if these are not key for the same assessment aspects then each can be assessed separately using the univariate assessment procedure. For example when assessing fit through a doorway, stature and bideltoid width might be considered key dimensions. However, given that they are not dependent on each other these might be assessed more efficiently using two univariate assessments rather than one multivariate assessment.

Given the nature of land vehicle design and evaluation, it is intended that the multivariate assessment procedure is used in combination with univariate assessments. For example when assessing a vehicle driving position, initial univariate assessments might include fit in terms of bideltoid width and seated height to check that the driver would fit in the vehicle. This would allow relatively quick assessment of fit to be made and issues identified. Assuming that no issues are identified by the univariate assessments, this would then be followed with multivariate assessments to provide a more detailed assessment of the driving position.

The multivariate procedure requires three inputs:

- The boundary manikins; as defined in Section 5.3.
- The relevant PECCFs; using the tables provided at Section 6.
- Any miscellaneous adjustments (if required); any other adjustments that should be added, for example a comfort clearance.

The assessment procedure consists of four phases intended to be performed using a Digital Human Modelling (DHM) package; i) manikin construction, ii) the application of PECCFs, iii) placing the boundary manikin in the CAD model and then iv) assessing the risks identified. This is conducted for each boundary manikin in turn. It is outside the scope of this document to detail this process within a DHM package, in part due to the differences between DHM packages.

In the multivariate assessment procedure shown in Figure 8, Stage 3.3 “Place boundary manikin in CAD model” will require tailoring against the required task. A suggested method for placing a boundary manikin at the driving position in a military land vehicle is provided in Figure 9. It is recommended that this be used as a basis for all vehicle postures and modified to reflect the task performed.

Test methods, pass-fail criteria and reporting requirements for each assessment aspect are shown in Table 8. It is noted that whilst fit, clearance, reach and vision can be assessed using visual methods, posture assessment is more complex. Posture assessment requires consideration of aspects such as task frequency, task duration, forces applied to/by the body, support of the limbs and joint angles. As such, it should be assessed against the risks of user injury and task performance impairment by a suitably qualified Human Factors Subject Matter Expert (SME).

Reporting from these assessment types should provide sufficient information to permit the assessment to be repeated, including:

- Descriptions of the task assessed, key task points, perceived risk and assessment type.
- The anthropometric dimensions considered key to the assessment.
- A summary of the inputs used.
- An image of the assessment that shows how all assessments were performed, the measurements taken and body landmarks used for each boundary.
- The outputs listed for each assessment type in Table 8 for each boundary manikin.
- A risk statement for any assessment failures which states the likelihood and consequence associated with the risk.

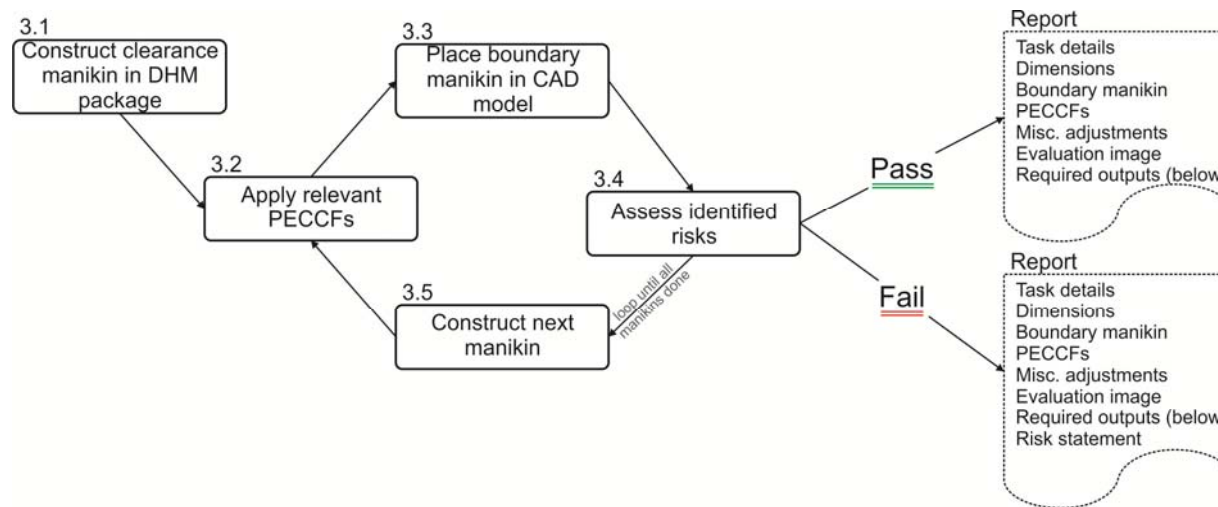


Figure 8 Multivariate assessment procedure

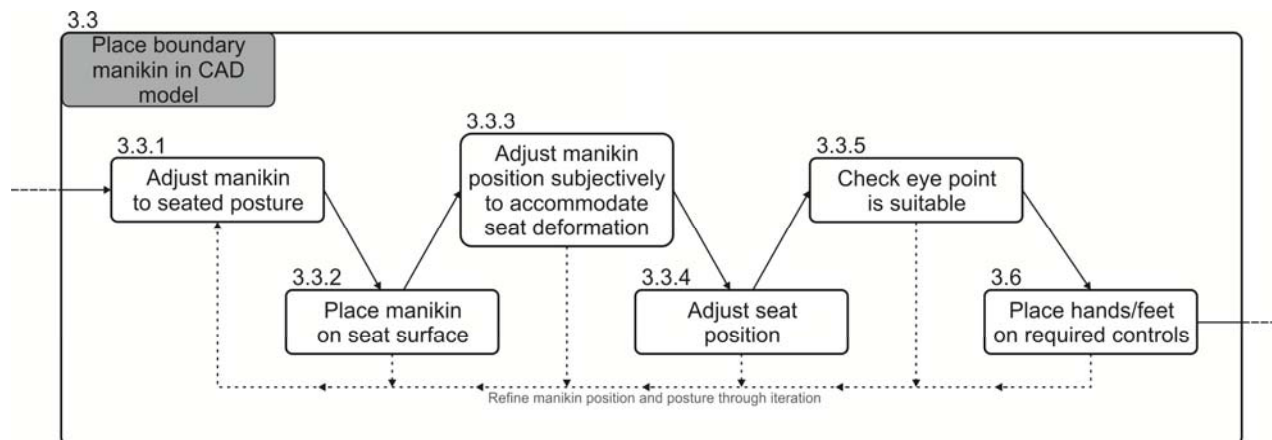


Figure 9 Multivariate assessment procedure – expansion on “Place boundary manikin in CAD model” for driving positions

Table 8 Assessment type and method including pass-fail criteria and reporting requirements

| Aspect | Test method | Pass-fail criteria | Reporting requirements | |
|-----------|---|---|---|--|
| | | | Pass | Fail |
| Fit | Visually check for surface interactions between manikin and surrounding surfaces | Any surface interactions = fail | Report clearances distances | Report interaction distances |
| Clearance | Measure distance from body to hazard surfaces | <0mm = fail | Report clearances distances | Report interaction distances |
| Reach | 1) Plot reach curves 2) Visually inspect layout for possible obstructions to reach. Adjust manikin to reach for any potentially obstructed controls | Any control outside of reach curves, and not possible to adjust manikin posture to reach control = fail | Report reach distance(s) and any required postural adjustment | Report reach distance(s) and measurement delta |
| Vision | 1) Plot vision cones 2) View mannequins eye camera. Adjust posture to view any obstructed items | Any item outside of vision cone and not possible to adjust manikin posture to view item = fail | Report items within view and any required postural adjustment | Report items outside of vision cones, distance from cone |
| Posture | Measure key joint angles; ankle flex/ext, knee flex/ext, hip flex/ext, shoulder flex/ext, shoulder ab/adduction, shoulder int/ext rotation, neck flex/ext, neck rotation, elbow flex/ext, wrist flex/ext and wrist radial/ulnar flexion | Posture assessment by Human Factors SME taking into account task frequency, task duration, forces applied to/by the body, support of the limbs and joint angles | Report all angles. Provide reasons for pass | Report all angles. Provide reasons for failure |

5.3 Boundary Manikin Data

The critical measurements of the boundary manikins are shown in Table 9. These dimensions are considered critical in the design of military land vehicles. Comprehensive dimensions for these mannequins can be found at Annex B to aid the production of manikins in DHM software.

Table 9 Boundary manikin critical measurements

| Dimension | Applicable PECCF | Manikin | | | | | | |
|--|------------------|-------------------------|-------------|------------------------------------|-------------------------------------|----------------------|-----------------------|--------------|
| | | A | B | C | D | E | F | G |
| | | Overall smallest female | Widest male | Largest upper body:lower body male | Smallest upper body:lower body male | Overall largest male | Overall smallest male | Average male |
| M09 Eye Height Sitting (mm) | - | 750 | 841 | 858 | 750 | 831 | 770 | 820 |
| M10 Acromion Height Sitting (mm) | EM22 | 559 | 606.5 | 644 | 562 | 636 | 595 | 609 |
| M11 Elbow Rest Height (mm) | - | 231.4 | 218.5 | 271 | 192 | 230 | 247 | 248 |
| M12 Thigh Clearance (mm) | EM27 | 153 | 172 | 162 | 179 | 196 | 153 | 187 |
| M13 Knee Height Sitting (mm) | EM28 | 484 | 571 | 564 | 561 | 581 | 534 | 566 |
| M14 Popliteal Height (mm) | EM29 | 381 | 473 | 455 | 454 | 471 | 438 | 454 |
| M17 Biacromial Breadth (mm) | - | 345 | 440 | 443 | 420 | 421 | 390 | 392 |
| M18 Bideloid Breadth (mm) | EM23 | 404 | 517 | 516 | 495 | 504 | 462 | 469.5 |
| M19 Chest Breadth (mm) | EM08 | 259 | 331 | 292 | 320 | 326.9 | 280 | 323.5 |
| M20 Chest Depth (mm) | EM09 | 226 | 237 | 260 | 244 | 290 | 236 | 221 |
| M21 Bicristale Breadth (mm) | - | 254 | 297 | 297 | 281 | 315 | 267 | 308.5 |
| M22 Forearm-Forearm Breadth (mm) | EM24 | 411 | 614 | 542 | 545 | 528 | 545.5 | 525 |
| M23 Abdominal Extension Depth Sitting (mm) | EM25 | 198 | 236 | 235 | 240 | 301 | 216 | 258.5 |
| M24 Hip Breadth Sitting (mm) | EM26 | 369 | 386 | 394 | 345 | 415 | 341 | 377.5 |
| M25 Buttock-Knee Length (mm) | EM30 | 543.5 | 645 | 608 | 610 | 669 | 571 | 622 |
| M26 Buttock-Popliteal Length (mm) | EM31 | 452.5 | 524 | 509 | 495 | 568 | 464 | 503 |
| M37 Thumbtip Reach (mm) | - | 684 | 898 | 760 | 750 | 847.5 | 747 | 809 |
| M38 Stature (mm) | EM01 | 1593 | 1884.2 | 1808 | 1760 | 1843 | 1684.5 | 1800 |
| M39 Sitting Height (mm) | EM21 | 864 | 982.7 | 976 | 913 | 956 | 896.6 | 940 |
| M40 Weight (kg) | EM02 | 58 | 85.1 | 83.5 | 80.4 | 95.1 | 69.4 | 83.8 |
| M50 Back Width (mm) | - | 289.3 | 410.6 | 373.1 | 379.4 | 370.2 | 354 | 384.6 |
| M51 Back Length (mm) | - | 427.6 | 490.3 | 466.5 | 430.2 | 495.4 | 448.3 | 432.7 |

| Dimension | Applicable PECCF | Manikin | | | | | | |
|---------------------------------------|---------------------|----------------------------|-------------|--|---|-------------------------|--------------------------|--------------|
| | | A | B | C | D | E | F | G |
| | | Overall smallest female | Widest male | Largest upper body:lower body male | Smallest upper body:lower body male | Overall largest male | Overall smallest male | Average male |
| M52 Nape to Waist Centre Back (mm) | - | 472.2 | 569.8 | 523.1 | 485.2 | 591 | 493.3 | 550.5 |
| M60 Acromion-Radiale Length (mm) | - | 290 | 364.4 | 338.6 | 349.6 | 350.3 | 318.9 | 342.6 |
| M61 Radiale-Stylian Length (mm) | - | 232.2 | 289.1 | 270.2 | 250.8 | 297.7 | 241.3 | 266.2 |

6. Personal Equipment and Clothing Correction Factors

6.1 Introduction

Anthropometric data are taken in a semi-nude state in order to accurately measure body dimensions. Statistical correction factors are therefore required to be added to the semi-nude data in order to represent the additional dimensions and volume of a soldier's encumbered state. This can include items such as boots, body armour and helmet. Collectively these statistical corrections are termed Personal Equipment and Clothing Correction Factors (PECCF).

When conducting either a univariate or multivariate assessment, relevant PECCFs should be added to the percentile data to represent an ADF Soldier wearing Soldier Combat Ensemble (SCE). Note that although anthropometric data is presented as two datasets; male and female, there is only one PECCF dataset which is applied to both the male and female data.

6.2 PECCF Data

PECCFs based on measurements collected of two ADF Soldier Combat Ensembles are summarised in Table 10. This table shows PECCF data for driver and dismounted close combatant Soldier Combat Ensembles wearing warm weather and cold weather clothing. These ensembles worn with warm weather clothing can be seen in Figure 10 and Figure 11.

Table 10 PECCF data

| Dimension | | PECCF (mm) | | | |
|-----------|---|-----------------------|-----------------------|----------------------------|-----------------------|
| | | Driver/Crew | | Dismounted Close Combatant | |
| | | Warm Weather Clothing | Cold Weather Clothing | Warm Weather Clothing | Cold Weather Clothing |
| EM01 | Stature (mm) | 69 | 71 | 71 | 71 |
| EM02 | Weight (kg) | 14 | 15 | 26 | 28 |
| EM03 | Head/Helmet Circumference (mm) | 327 | 327 | 246 | 246 |
| EM04 | Head/Helmet Breadth (mm) | 126 | 126 | 82 | 82 |
| EM05 | Head/Helmet Length (mm) | 65 | 65 | 54 | 54 |
| EM06 | Acromion Height (mm) | 57 | 57 | 57 | 57 |
| EM07 | Chest Circumference (mm) | 186 | 186 | 471 | 471 |
| EM08 | Chest Breadth (mm) | 18 | 18 | 24 | 25 |
| EM09 | Chest Depth (mm) | 79 | 80 | 251 | 251 |
| EM10 | Waist Circumference (omphalion) (mm) | 379 | 389 | 665 | 676 |
| EM11 | Buttock Circumference (mm) | 61 | 101 | 61 | 101 |
| EM12 | Crotch Height (mm) | -36 | -102 | -36 | -94 |
| EM13 | Hand Circumference (mm) | 27 | 27 | 27 | 27 |
| EM14 | Hand Breadth (mm) | 6 | 6 | 6 | 6 |
| EM15 | Hand Length (mm) | 10 | 10 | 10 | 10 |
| EM16 | Hand Thickness (mm) | 6 | 6 | 6 | 6 |
| EM17 | Ankle Height (mm) | 46 | 46 | 46 | 46 |
| EM18 | Foot Breadth, Horizontal (mm) | 9 | 9 | 9 | 9 |
| EM19 | Foot Length (mm) | 45 | 45 | 45 | 45 |
| EM20 | Ball of Foot Length (mm) | 17 | 17 | 17 | 17 |
| EM21 | Sitting Height (mm) | 35 | 36 | 31 | 31 |
| EM22 | Acromion Height, Sitting (mm) | 20 | 20 | 20 | 20 |
| EM23 | Bideltoid Breadth (mm) | 67 | 79 | 77 | 95 |
| EM24 | Forearm-Forearm Breadth (mm) | 125 | 156 | 183 | 196 |
| EM25 | Abdominal Extension Depth, Sitting (mm) | 86 | 91 | 266 | 272 |
| EM26 | Hip breadth, Sitting (mm) | 27 | 47 | 27 | 39 |
| EM27 | Thigh Clearance (mm) | 17 | 20 | 17 | 20 |
| EM28 | Knee Height, Sitting (mm) | 73 | 73 | 73 | 73 |
| EM29 | Popliteal Height (mm) | 43 | 43 | 43 | 43 |
| EM30 | Buttock-Knee Length (mm) | 21 | 44 | 21 | 44 |
| EM31 | Buttock-Popliteal Length (mm) | 9 | 9 | 9 | 9 |

UNCLASSIFIED



Figure 10 *Driver ensemble with warm weather clothing*



Figure 11 *Dismounted Close Combatant ensemble with warm weather clothing*

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7. Application Matrix

7.1 Anthropometric Dimension Application Matrix

Advice on the dimensions that should be considered when designing and/or assessing different military systems is provided in Table 11.


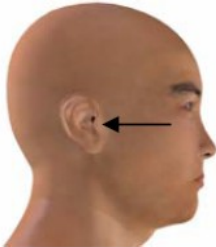
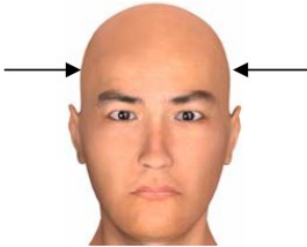


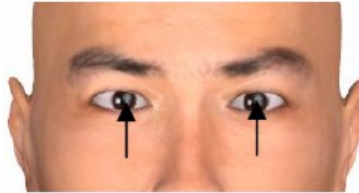
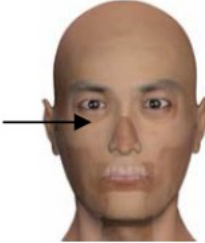
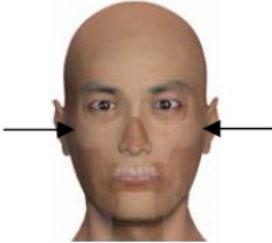
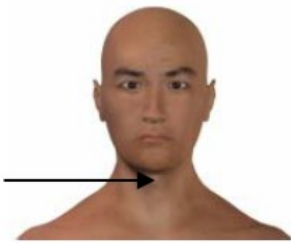
Table 11 Application matrix




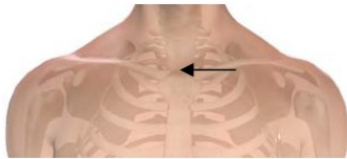

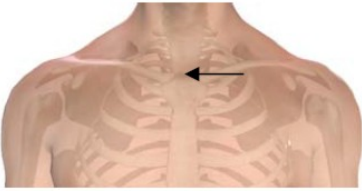



| Dimension | | Seated Working | Body Armour | Clothing | Headwear (e.g. helmets, respirators) | Footwear | Gloves |
|-----------|------------------------------------|----------------|-------------|----------|--------------------------------------|----------|--------|
| M01 | Cervicale Height | | X | | | | |
| M02 | T2 Height | | X | | | | |
| M03 | Acromion Height | X | | | | | |
| M04 | Suprasternale Height | | X | | | | |
| M05 | Substernale Height | | X | | | | |
| M06 | Tenth Rib Height | | X | | | | |
| M07 | Iliocristale Height | | X | X | | | |
| M08 | Crotch Height | | | X | | | |
| M09 | Eye Height, Sitting | X | | | | | |
| M10 | Acromion Height, Sitting | X | | | | | |
| M11 | Elbow Rest Height | X | | | | | |
| M12 | Thigh Clearance | X | | | | | |
| M13 | Knee Height, Sitting | X | | | | | |
| M14 | Popliteal Height | X | | | | | |
| M15 | Interpupillary Breadth | | | | X | | |
| M16 | Bizygomatic Breadth | | | | X | | |
| M17 | Biacromial Breadth | X | X | X | | | |
| M18 | Bideltoid Breadth | X | | | | | |
| M19 | Chest Breadth | X | X | X | | | |
| M20 | Chest Depth | X | X | X | | | |
| M21 | Bicristale Breadth | X | | | | | |
| M22 | Forearm Breadth | X | | | | | |
| M23 | Abdominal Extension Depth, Sitting | X | | | | | |
| M24 | Hip Breadth Sitting | X | | | | | |
| M25 | Buttock-Knee Length | X | | | | | |
| M26 | Buttock-Popliteal Length | X | | | | | |
| M27 | Foot Breadth | X | | | | X | |

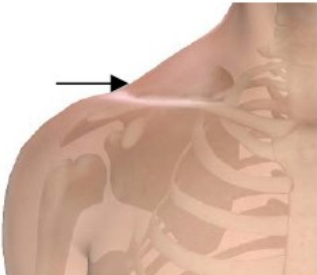
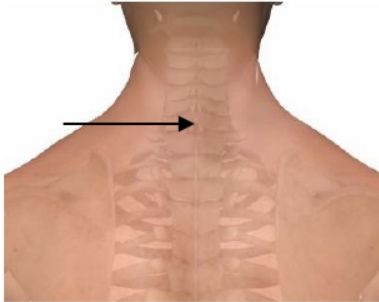
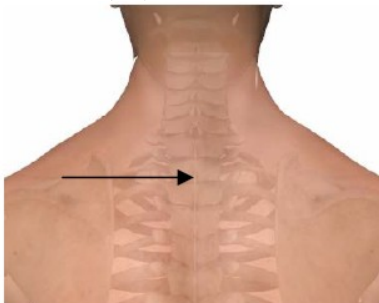
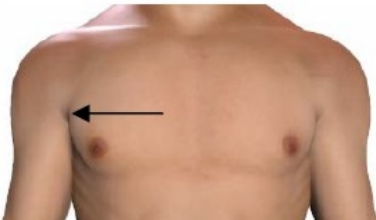





| Dimension | | Seated Working | Body Armour | Clothing | Headwear (e.g. helmets, respirators) | Footwear | Gloves |
|-----------|-----------------------------------|----------------|-------------|----------|--------------------------------------|----------|--------|
| M28 | Head Circumference | | | | X | | |
| M29 | Neck Circumference, Base | | | X | | | |
| M30 | Shoulder Length | | | X | | | |
| M31 | Biceps Circumference, Flexed | | | X | | | |
| M32 | Forearm Circumference, Flexed | | | X | | | |
| M33 | Chest Circumference | X | X | X | | | |
| M34 | Chest Circumference, Below Breast | | X | X | | | |
| M35 | Waist Circumference (Omphalion) | X | X | X | | | |
| M36 | Buttock Circumference | | | X | | | |
| M37 | Thumbtip Reach | X | | | | | |
| M38 | Stature | X | X | X | | | |
| M39 | Sitting Height | X | | | | | |
| M40 | Weight | X | X | X | | | |
| M41 | Head Breadth | X | | X | | | |
| M42 | Head Length | X | | X | | | |
| M43 | Menton-Sellion Length | | | | X | | |
| M44 | Bitragion Submandibular Arc | | | | X | | |
| M45 | Neck Circumference | | | X | X | | |
| M46 | Nape to Bustpoint Thelion Length | | | X | | | |
| M47 | Nape to Waist over Bust | | | X | | | |
| M49 | Scye Depth | | | X | | | |
| M50 | Back Width | | X | X | | | |
| M51 | Back Length | | X | X | | | |
| M52 | Nape to Waist Centre Back | | | X | | | |
| M53 | Vertical Trunk Circumference | | | X | | | |
| M54 | Crotch Length Omphalion | | | X | | | |
| M55 | Waist Circumference (Preferred) | | | X | | | |
| M56 | Hip Circumference | | | X | | | |
| M57 | Waist-Hip Distance | | | X | | | |
| M58 | High Hip Circumference | | | X | | | |
| M59 | Hip Circumference | | | X | | | |
| M60 | Acromion-Radiale Length | X | | X | | | |
| M61 | Radiale-Stylian Length | X | | X | | | |
| M62 | Sleeve Outseam | | | X | | | |


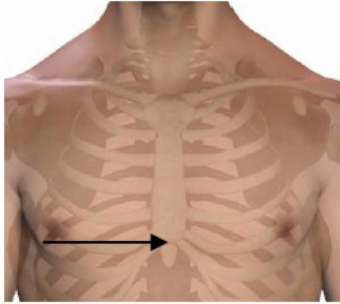
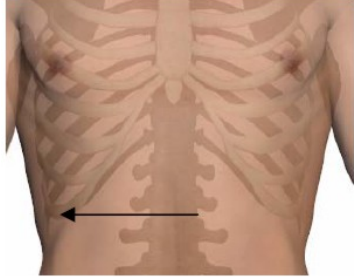






| Dimension | | Seated Working | Body Armour | Clothing | Headwear (e.g. helmets, respirators) | Footwear | Gloves |
|-----------|--------------------------|----------------|-------------|----------|--------------------------------------|----------|--------|
| M63 | Wrist Circumference | | | X | | | X |
| M64 | Hand Circumference | | | X | | | X |
| M65 | Hand Breadth | X | | X | | | X |
| M66 | Hand Length | X | | X | | | X |
| M67 | Thigh Circumference | | | X | | | |
| M68 | Knee Circumference | | | X | | | |
| M69 | Calf Circumference | | | X | | | |
| M70 | Ankle Circumference | | | X | | | |
| M71 | Foot Length | | | | | X | |
| M72 | Ball of Foot Length | | | | | X | |
| M73 | Seat Angle | | | X | | | |
| M74 | Outside Leg Length | | | X | | | |
| M75 | Chest Level | | | X | | | |
| M76 | Bust Level | | | X | | | |
| M77 | Waist Level Centre Front | | | X | | | |
| M78 | Hip Level, female | | | | | | |
| M79 | Waist Level Centre Back | | | X | | | |
| M80 | Seat Level | | | X | | | |
| M81 | Trochanteric Height | | | X | | | |
| M82 | Hip, male | | | X | | | |
| M83 | Knee Level | | | X | | | |
| M84 | Ankle Height | | | X | | X | |
| M85 | Front Length | | X | | | | |



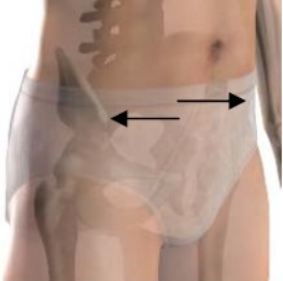
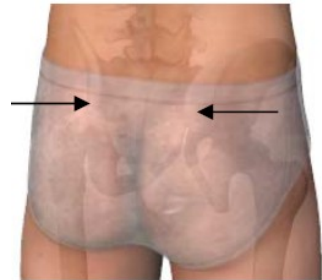





BODY LANDMARK DEFINITIONS


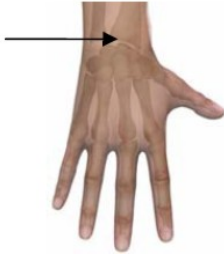
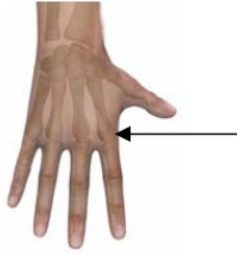
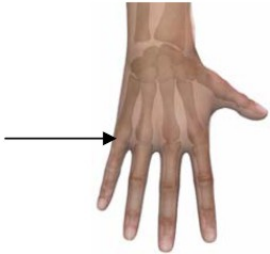

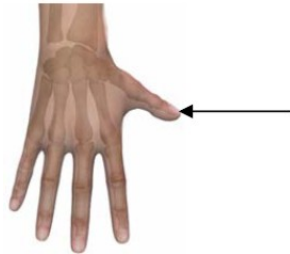



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| <p>Top of the Head: The highest point of the head when the head is in the Frankfort Plane.</p>  | <p>Tragion (Right and Left): The superior point on the juncture of the cartilaginous flap (tragus) of the ear with the head.</p>  | <p>Head Breadth Marker (Right and Left): The most lateral point on the head above the ears.</p>  |
| <p>Glabella: The most anterior point on the frontal bone midway between the bony brow ridges.</p>  | <p>Ectocanthus: The outside corner of the right eye formed by the meeting of the upper and lower eyelids.</p>  | <p>Centre of Pupil (Right and Left): The centre of the pupil of the eye.</p>  |
| <p>Infraorbitale: The lowest point on the anterior border of the bony eye socket.</p>  | <p>Zygion (Right and Left): The most lateral points on the zygomatic arches.</p>  | <p>Submandibular: The juncture in the mid-sagittal plane of the lower jaw and the neck.</p>  |


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| <p>Sellion: The deepest depression of the nasal bones at the top of the nose.</p>  | <p>Menton: The inferior point of the mandible in the mid-sagittal plane.</p>  | <p>Opisthocranium: The posterior point on the back of the head.</p>  |
| <p>Anterior Neck: A mark made midway between the medial superior borders of the right and left clavicle.</p>  | <p>Lateral Neck (Right and Left): Lateral points located at the base of the neck.</p>  | <p>Suprasternale: The inferior point of the jugular notch at the top of the sternum.</p>  |
| <p>Trapezius Point (Right and Left): The point at which the anterior border of the trapezius muscle crosses the Lateral Neck landmark.</p>  | <p>Clavicle Point (Right and Left): The superior points on the lateral ends of the clavicle.</p>  | <p>Acromion (Right and Left): The point of intersection between the lateral border of the Acromion process and the extension of a line drawn from Trapezius Point which crosses over the Clavicle point landmark.</p>  |

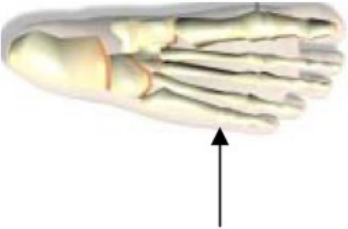



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| <p>Midshoulder: The point on the top of the right shoulder midway between Trapezius Point, Right and Acromion, Right.</p>  | <p>Cervicale: The superior palpable point of the spine of the seventh cervical (C7) vertebrae.</p>  | <p>T2: The superior palpable point of the spine of the second thoracic (T2) vertebrae.</p>  |
| <p>Anterior Scye on the Torso: A point on the anterior torso in line with the height of the axilla.</p>  | <p>Posterior Horizontal Scye (Right and Left): A point on the posterior torso in line with the height of the axilla.</p>  | <p>Scye Level at Midspine: A point on the posterior torso in line with the height of the axilla, at the midspine.</p>  |
| <p>Back Length Marker: The point on the spine equidistant between the heights of the Iliocristale, Right and Iliocristale, Left landmarks.</p>  | <p>Thelion, Right: The centre of the nipple, right (males only).</p>  | <p>Bustpoint, Right: The most anterior point of the right bra cup (females only).</p>  |

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| <p>Inferior Breastpoint: The most inferior point of the juncture of the lower of the two breasts with the torso (females only).</p>  | <p>Substernale: The lowest palpable point on the sternum.</p>  | <p>Tenth Rib: The inferior point on the right tenth rib.</p>  |
| <p>Abdominal Point, Anterior: The most protruding point of the relaxed abdomen of the seated subject.</p>  | <p>Waist (Omphalion) Anterior: The centre of the navel.</p>  | <p>Waist Preferred, Anterior: An anterior point of the torso in line with the spine and the preferred waist height.</p>  |
| <p>Waist Preferred, Posterior: A posterior point of the torso in line with the spine and the preferred waist height.</p>  | <p>Waist (Omphalion) Posterior: A point on the spine at the height of the Waist, Omphalion, Anterior landmark.</p>  | <p>Waist Preferred Posterior, Projected: A point on the right hand side of the anterior torso at the height of the Waist Preferred, Posterior landmark and a line projected vertically from the Thelion (Right) / Bustpoint (Right) landmark.</p>  |

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| <p>High Hip Marker: The anterior point on the torso 8 cm below the Waist Preferred, Anterior landmark.</p>  | <p>Hip Marker: The maximum lateral trochanteric protrusion on the right side of the body.</p>  | <p>Anterior Superior Iliac Spine (ASIS) (Right and Left): The anterior point of the right and left iliac crests, respectively.</p>  |
| <p>Posterior Superior Iliac Spine (Right and Left): The posterior point of the crest of ilium.</p>  | <p>Iliocristale (Right and Left): The highest palpable point of the iliac crests of the pelvis.</p>  | <p>Biceps Point: The highest point of the right flexed biceps as viewed from the subject's right side.</p>  |
| <p>Elbow Crease: The skin crease on the anterior aspect of the elbow joint when the elbow is flexed to 90°.</p>  | <p>Olecranon Bottom: The lowest point of the elbow with the elbow joint flexed at 90°.</p>  | <p>Radiale: The highest point on the outside edge of the radius.</p>  |

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| <p>Stylian: The lowest point of the distal radius.</p>  | <p>Centre Wrist Marker: The point on the dorsal aspect of the wrist, (at the level of the Stylian), at the mid-width of the wrist.</p>  | <p>Metacarpale II: The anterior point on the right second metacarpophalangeal joint.</p>  |
| <p>Metacarpale V: The posterior point on the right fifth metacarpophalangeal joint.</p>  | <p>Dactylion III, Right: The tip of the middle finger.</p>  | <p>Thumbtip: The tip of the right thumb.</p>  |
| <p>Crotch: The underside of the groin on the right side of the genitalia.</p>  | <p>Buttock Point Posterior: The point of maximal protrusion of the right buttock.</p>  | <p>Trochanter: A point at the centre of the lateral surface of the right greater trochanter on a sitting subject.</p>  |

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| <p>Trochanterion: The superior point of the greater trochanter of the right femur on a standing subject.</p>  | <p>Thigh Point, Top: The highest point of the top of the right thigh on a seated subject.</p>  | <p>Lateral Femoral Epicondyle, Sitting: The lateral point of the right femoral epicondyle while seated.</p>  |
| <p>Lateral Femoral Epicondyle, Standing: The lateral point of the right femoral epicondyle.</p>  | <p>Suprapatella: The superior point of the patella.</p>  | <p>Knee Point, Anterior: The most protruding point of the right kneecap of the subject in Anthropometric Sitting posture.</p>  |
| <p>Midpatella: The anterior point midway between the top and bottom of the right patella.</p>  | <p>Dorsal Juncture of Calf and Thigh: The juncture between the right calf and thigh behind the knee for the subject in the Anthropometric Sitting posture.</p>  | <p>First Metatarsophalangeal Protrusion: The most medial protrusion of the right foot in the region of the first metatarsophalangeal joint.</p>  |

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| <p>Fifth Metatarsophalangeal Protrusion: The most lateral protrusion of the right foot in the region of the fifth metatarsophalangeal joint.</p>  | <p>Lateral Malleolus: The most lateral point on the right lateral malleolus.</p>  | <p>Pternion: The most posterior point of the right heel.</p>  |
| <p>Acropodion: The tip of the first or second toe, whichever is longer.</p>  | | |

ANNEX B

BOUNDARY MANIKIN MEASUREMENTS

| Dimension | A | B | C | D | E | F | G |
|--|-------------------------|-------------|------------------------------------|-------------------------------------|----------------------|-----------------------|--------------|
| | Overall smallest female | Widest male | Largest upper body:lower body male | Smallest upper body:lower body male | Overall largest male | Overall smallest male | Average male |
| M01 Cervicale Height (mm) | 1355 | 1605 | 1546 | 1496 | 1595 | 1436 | 1526 |
| M02 T2 Height (mm) | 1304 | 1545 | 1501 | 1441 | 1557 | 1401 | 1496 |
| M03 Acromion Height (mm) | 1297 | 1505 | 1459 | 1419 | 1535 | 1371 | 1471 |
| M04 Suprasternale Height (mm) | 1289 | 1514 | 1472 | 1426 | 1510 | 1359 | 1467 |
| M05 Substernale Height (mm) | 1096 | 1348 | 1306 | 1264 | 1343 | 1201 | 1254 |
| M06 Tenth Rib Height (mm) | 988 | 1201 | 1132 | 1130 | 1201 | 1088 | 1157 |
| M07 Iliocristale Height (mm) | 957 | 1120 | 1095 | 1087 | 1123 | 997.5 | 1112 |
| M08 Crotch Height (mm) | 760 | 891 | 859 | 857 | 910 | 814 | 870 |
| M09 Eye Height Sitting (mm) | 750 | 841 | 858 | 750 | 831 | 770 | 820 |
| M10 Acromion Height Sitting (mm) | 559 | 606.5 | 644 | 562 | 636 | 595 | 609 |
| M11 Elbow Rest Height (mm) | 231.4 | 218.5 | 271 | 192 | 230 | 247 | 248 |
| M12 Thigh Clearance (mm) | 153 | 172 | 162 | 179 | 196 | 153 | 187 |
| M13 Knee Height Sitting (mm) | 484 | 571 | 564 | 561 | 581 | 534 | 566 |
| M14 Popliteal Height (mm) | 381 | 473 | 455 | 454 | 471 | 438 | 454 |
| M15 Interpupillary Breadth (mm) | 64 | 67 | 74 | 69 | 62 | 57 | 59 |
| M16 Bizygomatic Breadth (mm) | 125 | 142.5 | 121 | 125 | 141 | 132 | 138 |
| M17 Biacromial Breadth (mm) | 345 | 440 | 443 | 420 | 421 | 390 | 392 |
| M18 Bideltoid Breadth (mm) | 404 | 517 | 516 | 495 | 504 | 462 | 469.5 |
| M19 Chest Breadth (mm) | 259 | 331 | 292 | 320 | 326.9 | 280 | 323.5 |
| M20 Chest Depth (mm) | 226 | 237 | 260 | 244 | 290 | 236 | 221 |
| M21 Bicristale Breadth (mm) | 254 | 297 | 297 | 281 | 315 | 267 | 308.5 |
| M22 Forearm-Forearm Breadth (mm) | 411 | 614 | 542 | 545 | 528 | 545.5 | 525 |
| M23 Abdominal Extension Depth Sitting (mm) | 198 | 236 | 235 | 240 | 301 | 216 | 258.5 |
| M24 Hip Breadth Sitting (mm) | 369 | 386 | 394 | 345 | 415 | 341 | 377.5 |
| M25 Buttock-Knee Length (mm) | 543.5 | 645 | 608 | 610 | 669 | 571 | 622 |
| M26 Buttock-Popliteal Length (mm) | 452.5 | 524 | 509 | 495 | 568 | 464 | 503 |
| M27 Foot Breadth (mm) | 92 | 101 | 99 | 107 | 104.5 | 101 | 101 |
| M28 Head Circumference (mm) | 552.5 | 572 | 585 | 560 | 576 | 569 | 553 |
| M29 Neck Circumference Base (mm) | 379 | 442 | 445 | 449 | 442 | 430 | 429 |
| M30 Shoulder Length (mm) | 109.5 | 160 | 159 | 148 | 152 | 130 | 119 |
| M31 Biceps Circumference Flexed (mm) | 275.5 | 346 | 341 | 363 | 365 | 385 | 327 |
| M32 Forearm Circumference Flexed (mm) | 250 | 307 | 302 | 323 | 310 | 306 | 321 |

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| Dimension | A | B | C | D | E | F | G |
|--|-------------------------|-------------|------------------------------------|-------------------------------------|----------------------|-----------------------|--------------|
| | Overall smallest female | Widest male | Largest upper body:lower body male | Smallest upper body:lower body male | Overall largest male | Overall smallest male | Average male |
| M33 Chest Circumference (mm) | 842 | 1028 | 995 | 999 | 1060 | 947 | 999 |
| M34 Chest Circumference Below Breast (mm) | 715 | - | - | - | - | - | - |
| M35 Waist Circumference Omphalion (mm) | 731 | 843 | 882.5 | 846 | 1009 | 779 | 909 |
| M36 Buttock Circumference (mm) | 927 | 1017 | 1034 | 974 | 1109 | 912 | 1006 |
| M37 Thumbtip Reach (mm) | 684 | 898 | 760 | 750 | 847.5 | 747 | 809 |
| M38 Stature (mm) | 1593 | 1884 | 1808 | 1760 | 1843 | 1685 | 1800 |
| M39 Sitting Height (mm) | 864 | 982.7 | 976 | 913 | 956 | 896.6 | 940 |
| M40 Weight (kg) | 58 | 85.1 | 83.5 | 80.4 | 95.1 | 69.4 | 83.8 |
| M41 Head Breadth (mm) | 152.2 | 165.2 | 159.3 | 157.1 | 160.6 | 157.2 | 161.7 |
| M42 Head Length (mm) | 225.7 | 205.1 | 215 | 208.1 | 206 | 208.1 | 202.2 |
| M43 Menton-Sellion Length (mm) | 112.1 | 121.7 | 130.9 | 128.7 | 123.8 | 128 | 123.4 |
| M44 Bitragion Submandibular Arc (mm) | 245.5 | 326.6 | 293.1 | 297.7 | 325.3 | 311.3 | 312.1 |
| M45 Neck Circumference (mm) | 296.1 | 395.8 | 388.2 | 392.8 | 393.1 | 367.9 | 392.4 |
| M46 Nape to Bustpoint Thelion Length (mm) | 350.5 | 390.6 | 393.6 | 382.7 | 399.2 | 362.1 | 390.2 |
| M47 Nape to Waist over Bust (mm) | 568.3 | 681.1 | 641.4 | 623.2 | 694.2 | 611.2 | 692.3 |
| M49 Scye Depth (mm) | 179.4 | 225.1 | 209.6 | 182.8 | 224.7 | 194.4 | 185.5 |
| M50 Back Width (mm) | 289.3 | 410.6 | 373.1 | 379.4 | 370.2 | 354 | 384.6 |
| M51 Back Length (mm) | 427.6 | 490.3 | 466.5 | 430.2 | 495.4 | 448.3 | 432.7 |
| M52 Nape to Waist Centre Back (mm) | 472.2 | 569.8 | 523.1 | 485.2 | 591 | 493.3 | 550.5 |
| M53 Vertical Trunk Circumference Wide (mm) | 1496.9 | 1796 | 1786 | 1684 | 1782 | 1641 | 1797 |
| M54 Crotch Length Omphalion (mm) | 632.4 | 815 | 746.8 | 727.4 | 748.2 | 716.5 | 769.5 |
| M55 Waist Circumference Preferred (mm) | 811.3 | 884.4 | 902.5 | 872.1 | 1058 | 818.3 | 947.5 |
| M56 Maximum Hip Circumference (mm) | 961.5 | 1063 | 1078 | 1006 | 1126 | 949.4 | 1052 |
| M58 High Hip (mm) | 901 | - | - | - | - | - | - |
| M59 Hip (mm) | 961.2 | 1062 | 1080 | 1007 | 1133 | 919 | 1044 |
| M60 Acromion-Radiale Length (mm) | 290 | 364.4 | 338.6 | 349.6 | 350.3 | 318.9 | 342.6 |
| M61 Radiale-Stylian Length (mm) | 232.2 | 289.1 | 270.2 | 250.8 | 297.7 | 241.3 | 266.2 |
| M62 Sleeve Outseam (mm) | 534 | 660.5 | 614.3 | 615 | 656 | 566.3 | 618 |
| M63 Wrist Circumference (mm) | 162.9 | 189.3 | 183.5 | 181.1 | 194.4 | 181.2 | 182.1 |
| M64 Hand Circumference (mm) | 185 | 237.8 | 207.7 | 211.3 | 223.8 | 215.6 | 220 |
| M65 Hand Breadth (mm) | 78.7 | 92.7 | 88.3 | 89.6 | 95.3 | 88.4 | 88.8 |
| M66 Hand Length (mm) | 175.5 | 207.4 | 200.1 | 191.4 | 189.7 | 201.8 | 196.3 |
| M67 Thigh Circumference (mm) | 573.5 | 617.4 | 636.9 | 585.1 | 706.8 | 582 | 635.8 |

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| Dimension | A | B | C | D | E | F | G |
|-----------------------------------|-------------------------|-------------|------------------------------------|-------------------------------------|----------------------|-----------------------|--------------|
| | Overall smallest female | Widest male | Largest upper body:lower body male | Smallest upper body:lower body male | Overall largest male | Overall smallest male | Average male |
| M68 Knee Circumference (mm) | 373.2 | 405.1 | 407.3 | 374.4 | 422.2 | 377.8 | 385.4 |
| M69 Calf Circumference (mm) | 391.7 | 388 | 395.6 | 408 | 390.9 | 384.8 | 375.2 |
| M70 Ankle Circumference (mm) | 228.6 | 238.4 | 234.3 | 233 | 222.3 | 229.4 | 220.8 |
| M71 Foot Length (mm) | 236.2 | 290.9 | 275.2 | 270.1 | 271.8 | 265.2 | 268.5 |
| M72 Ball of Foot Length (mm) | 187.8 | 216.6 | 199.3 | 204.3 | 202 | 204.9 | 197.5 |
| M73 Seat Angle (°) | 15.7 | 12.7 | 27.4 | 18.1 | 16.6 | 19.7 | 14.2 |
| M75 Chest Level (mm) | - | 1384 | 1308 | 1270 | 1339 | 1215 | 1305 |
| M76 Bust Level (mm) | 1131.6 | - | - | - | - | - | - |
| M77 Waist Level Centre Front (mm) | 902.2 | 1077 | 1013 | 999.3 | 1018 | 924.8 | 995.2 |
| M78 Hip Level female (mm) | 742.8 | - | - | - | - | - | - |
| M79 Waist Level Centre Back (mm) | 916.9 | 1090 | 1059 | 1028 | 1045 | 961.3 | 1001 |
| M80 Seat Level (mm) | 760.8 | 949.9 | 897.4 | 909.7 | 958.4 | 842.3 | 908.5 |
| M81 Trochanteric Height (mm) | 803.7 | 1023 | 912.1 | 930.5 | 968.3 | 888.9 | 916.5 |
| M82 Hip Level (mm) | - | 913.9 | 829.5 | 876.7 | 929.8 | 754 | 855 |
| M83 Knee Level (mm) | 431.8 | 530.7 | 508 | 501.2 | 519.7 | 480.7 | 492.3 |
| M84 Ankle Height (mm) | 73.6 | 73.4 | 82.4 | 65.1 | 70 | 71.9 | 72.1 |
| M85 Front Length (mm) | 332 | 394 | 377 | 339 | 387 | 361.5 | 355 |

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| 19. ABSTRACT Anthropometry is the measurement and comparison of different body shapes and sizes in the general population. This standard presents anthropometric data representative of Australian Defence Force (ADF) Army, specifies the summary values for 84 anthropometric dimensions, provides a set of boundary manikins and provides guidance on how the data presented can be used to perform anthropometric assessments to assess fit, clearance, reach, vision and/or posture of a human operator in a system using a risk based approach. The procedures and data provided within this standard are intended to be used to evaluate soldier systems for use by the Australian Army in terms of user fit, clearance, reach, vision and posture. Soldier systems that this is applicable to include land vehicles and body worn equipment. In addition to providing a method for producing verification evidence for completed system designs, it is intended that the data and procedures given in this standard can be used early in the design process to de-risk the design process as a built system is not a requirement of the processes described in this standard. It must be noted that the data provided in this report is representative of the 2012 ADF Army population. The impact of secular growth | | | | | |

changes are not addressed in this standard and, should secular growth be identified as of importance, appropriate modifications should be made to the data contained in this standard.

This report supports Defence outcomes by providing an up to date anthropometric dataset that is representative of Australian Army personnel. This will allow assessments to be made of the performance of existing and new soldier systems in terms of fit, clearance, reach, vision and posture.

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